# Bailly Generating Station

## Advanced Flue Gas Desulfurization System

## FINAL

# ENVIRONMENTAL INFORMATION VOLUME

April 1989

**Pure Air**

a joint venture company

Air Products and Chemicals, Inc.

Mitsubishi Heavy Industries America, Inc.

TABLE OF CONTENTS

TABLE OF CONTENTS (Continued)

TABLE OF CONTENTS (Continued)

## LIST OF TABLES

LIST OF TABLES (Continued)

## LIST OF FIGURES

## LIST OF APPENDICES

## 1.0 INTRODUCTION

Pure Air, a joint venture between Air Products and Chemicals, Inc. and Mitsubishi Heavy Industries America, Inc., is proposing to design, construct and operate an advanced flue gas desulfurization (AFGD) system that affords numerous technological and commercial advantages over existing systems. The project will be funded by Pure Air and the U.S. Department of Energy (DOE) as part of the DOE's Innovative Clean Coal Technology Program. The AFGD system will be installed and operated at the Northern Indiana Public Service Company's (Northern Indiana) Bailly Generating Station located approximately 12 miles northeast of Gary, Indiana on the southern shore of Lake Michigan.

Significant decreases in sulfur dioxide ($SO_2$) emissions from high sulfur coals are expected to result from operation of the AFGD system: guaranteed 90 percent reduction during operation, and testing at 95 percent. Operation of the system will demonstrate not only a high efficiency of $SO_2$ removal on high sulfur coals, but also will demonstrate the following technological features:

1. The applicability and reliability of flue gas desulfurization (FGD) using a single module to control emissions from multiple boilers;

2. The functionality of a single loop, in-situ oxidation gypsum producing absorber on high sulfur and high chloride coals; and,

3. The demonstration of an evaporation system to minimize wastewater disposal problems inherent with many FGD systems.

In addition to these technological features, the demonstration project will advance several important and highly innovative commercial features that also contribute significantly to a greater reduced cost for achieving $SO_2$ emission reductions over conventional FGD systems. An overview of these features follows:

1. Pure Air will own and operate the AFGD facility during the demonstration period of three years and later during commercial operation. This approach will result in substantial operational savings compared to existing FGD systems.

2. Multiple boilers connected to a single module will significantly reduce costs at power stations with multiple smaller boiler units.

E-1

3. The production and potential sale of high quality, by-product gypsum (minimum 95 weight percent $CaSO_4 \cdot 2H_2O$, typically 1.9 weight percent $CaCO_3$ and 3.1 weight percent inert) will also contribute to the savings achieved by this demonstration project, and minimize the problem of solid-waste disposal. As part of the proposed effort, Pure Air has obtained statements of interest from wallboard manufacturers to purchase the by-product gypsum.

4. Powdered limestone will be used in the AFGD system. The purchase and dry charging of powdered limestone, based on preliminary quotes, should significantly reduce the capital and operating costs of the AFGD system.

The intent of Pure Air and Northern Indiana to enter into a commercial arrangement whereby Pure Air will continue to own and operate the AFGD facility at the Bailly

Station for the 17-year commercial period, after the successful completion of the demonstration program, constitutes a unique and commercially attractive industrial alternative to the utility own/operate scenario. This commercial operation will result in a significant reduction of interstate $SO_2$ emissions during the 17-year commercial period.

The purpose of this Environmental Information Volume (EIV) is to provide to the DOE a data base, analyses and impact assessments for the AFGD system. The EIV follows the guidelines established in the DOE's Environmental Guidance Manual and addresses the environmental issues associated with development and commercial operation of the AFGD system.

The comments made by the Department of Energy on the Draft EIV have been included as Appendix E. Each comment has been numbered and the response is referenced in the text by notation(s).

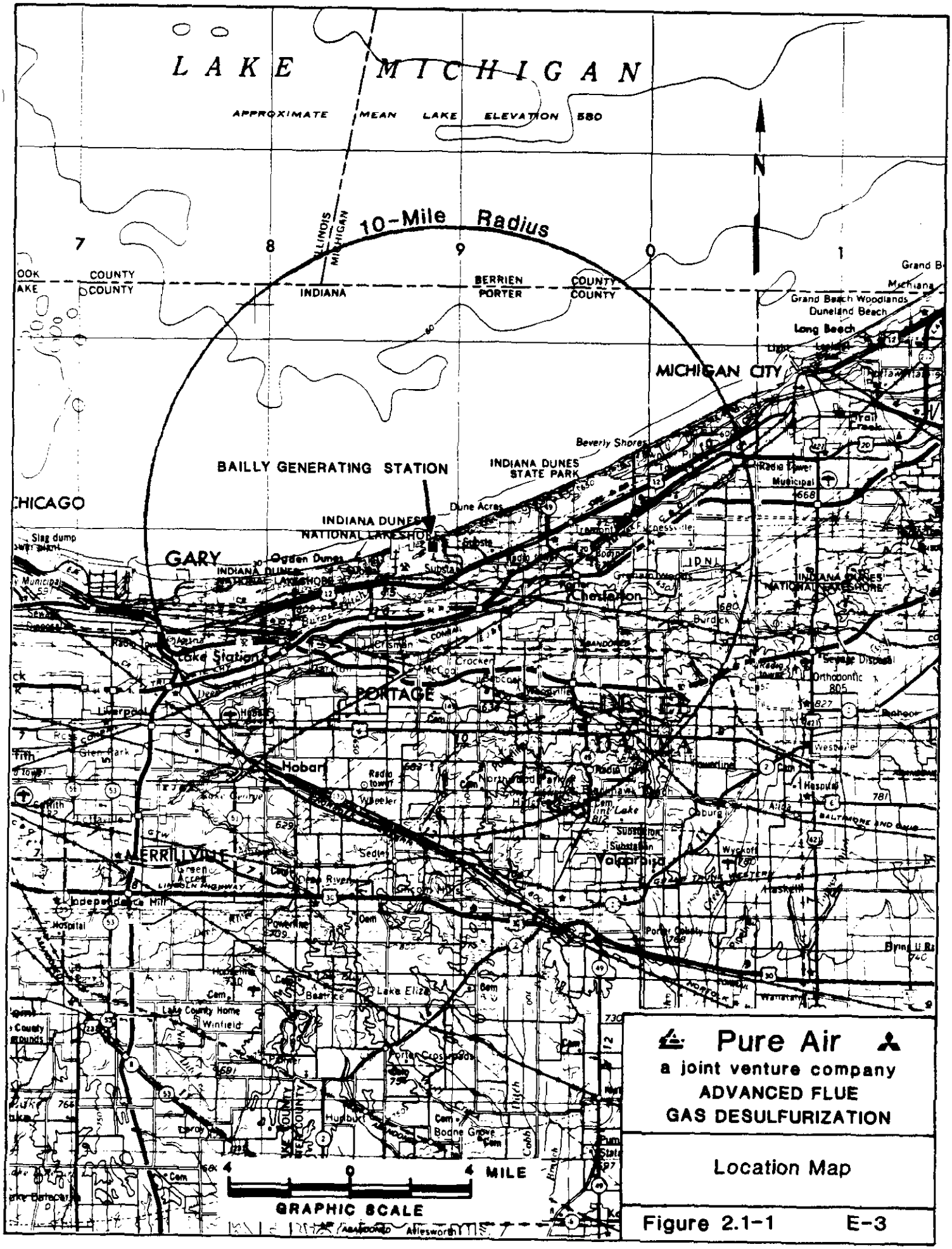
## 2.0 THE PROPOSED ACTION AND ITS ALTERNATIVES

### 2.1 THE PROPOSED ACTION

As indicated in Section 1.0, Introduction, Pure Air proposes to install an advanced flue gas desulfurization (AFGD) system at Northern Indiana's Bailly Generating Station, which occupies a 300-acre tract in Porter County, Indiana (Figure 2.1-1). When constructed, the AFGD system will occupy approximately four acres of land on the station site.

The AFGD system is designed to process flue gas from coals containing between 2.0 and 4.51 weight percent sulfur, which is typical of coals found in the Illinois/ Indiana basin. The project will utilize Mitsubishi's basic wet limestone flue gas desulfurization technology with many advanced features to achieve high $SO_2$ removal efficiency (90 percent capability) on these coals. This will be achieved at extremely low capital and operating costs (approximately 50 percent of the cost of currently available systems). In addition, the system will be operated to demonstrate the potential for reducing solid- or liquid-waste disposal problems. Part of the process' by-product will be a high quality gypsum which may be sold to a wallboard manufacturer or other user of high-quality gypsum. E-4 E-2

The AFGD system will be run for a demonstration period of three years as part of the U.S. Department of Energy's (DOE) Innovative Clean Coal Technology Program. After the successful completion of this demonstration period, Pure Air and Northern Indiana intend to enter into a commercial arrangement whereby Pure Air will continue to own and operate the AFGD System for an additional 17 years giving the system a 20-year life cycle.




**Pure Air**
a joint venture company
ADVANCED FLUE GAS DESULFURIZATION

Location Map

Figure 2.1-1 E-3

### 2.1.1 Site Description

The AFGD system and supporting facilities will be constructed on a 4-acre tract adjacent to Units 7 and 8 of the existing Northern Indiana Bailly Generating Station. The 300-acre site is entirely owned by Northern Indiana, and was originally purchased in 1932. All activities within the boundaries of the site are currently confined to the generation of electrical power.

Because the site is located in an area that is well industrialized, access to the site is readily available by way of railroads and main highways. Highway 12 runs along the southeast section of the site as does the Chicago, South Shore & South Bend Railroad. Highway 20 passes within two miles of the site, and Interstate Highway 94 is located five miles south of the site. The Bailly Generating Station is zoned for heavy industry, as indicated on Figure 2.1-2, "Westchester Township Zone Map," and is suitable for the AFGD system.

#### 2.1.1.1 Site Location

As indicated above, the Bailly Generating Station is located in Westchester Township, Porter County, Indiana on the southern end of Lake Michigan. It is 12 miles northeast of the center of Gary, Indiana, between the towns of Ogden Dunes three miles to the west and Dune Acres two miles to the east. Lake Michigan is north of the plant site and Bethlehem Steel Corporation, south and west. To the west are the Port of Indiana and Midwest Steel. The Indiana Dunes State Park and Indiana Dunes National Lakeshore are also primarily to the east. The towns of Portage, Burns Harbor, Chesterton and Porter lie within five miles south of the station. Additionally, the downtown Chicago Loop area is about 30

# WESTCHESTER TOWNSHIP

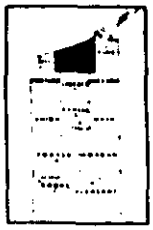
## PORTER COUNTY, INDIANA

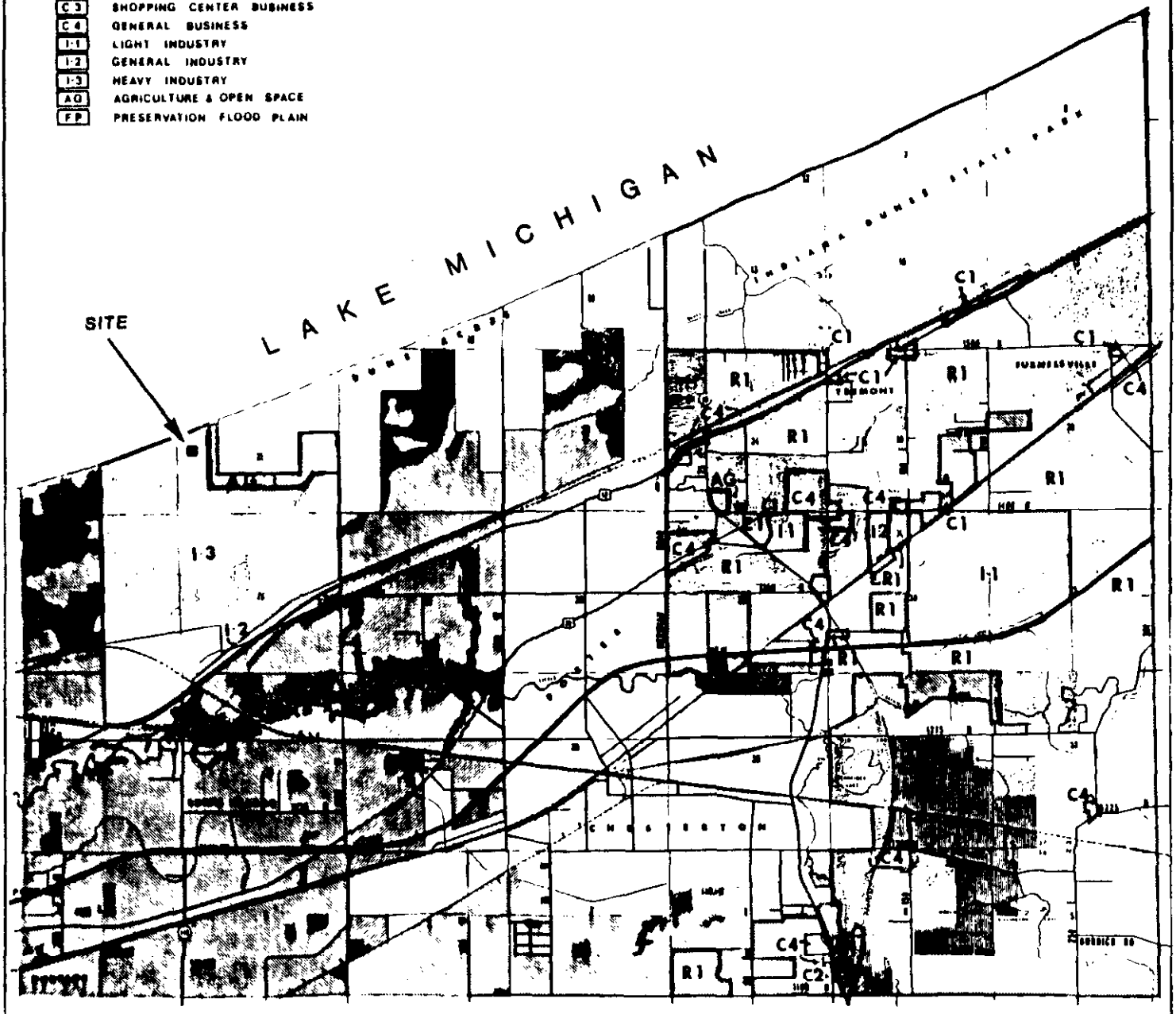
PREPARED FOR THE PORTER COUNTY PLAN COMMISSION

### ZONE MAP

LEGEND

| | |
|---|---|
| RR | RURAL RESIDENTIAL |
| R1 | SINGLE FAMILY RESIDENTIAL |
| R2 | TWO FAMILY RESIDENTIAL |
| R3 | MULTIPLE FAMILY RESIDENTIAL |
| RMH | RESIDENTIAL MOBILE HOMES |
| C1 | NEIGHBORHOOD BUSINESS |
| C2 | OFFICES AND INSTITUTIONS |
| C3 | SHOPPING CENTER BUSINESS |
| C4 | GENERAL BUSINESS |
| I-1 | LIGHT INDUSTRY |
| I-2 | GENERAL INDUSTRY |
| I-3 | HEAVY INDUSTRY |
| AG | AGRICULTURE & OPEN SPACE |
| FP | PRESERVATION FLOOD PLAIN |






0 5000

Scale in Feet

Pure Air

a joint venture company

ADVANCED FLUE GAS DESULFURIZATION

Westchester Township Zone Map

Figure 2.1-2

miles northwest; the Illinois-Indiana boundary is about 21 miles due west; Michigan City, Indiana, and the Indiana-Michigan boundary are about 13 and 18 miles east northeast of the station, respectively.

The legal description of the site is as follows: the west and south 1/2 of Section 21, Township 37 North, Range 6 West of the Second Principal Meridian in Westchester Township, Porter County, Indiana.

2.1.1.2 Existing Plant Operation

The main plant consists of two high-pressure steam boilers, each connected to its own steam turbine generator. The station went into commercial operation on December 1, 1962, when the first unit, Unit 7, rated at 183,000 KW went "on line". The second unit at the station, Unit 8, entered service in 1968 and is rated at 345,000 KW.

The coal burned in the boilers is delivered to the plant in railroad cars. The boilers consume approximately 1.1 million tons of coal a year - approximately 50 railroad cars per day. Although coal is the normal fuel, natural gas can also be burned in the boilers.

At full load, Unit 7 boiler produces 1,200,000 pounds of steam per hour at a pressure of 2,400 pounds per square inch and a temperature of 1,000$^{O}$ F. Unit 8 produces 2,600,000 pounds of steam per hour at a pressure of 3,500 pounds per square inch and a temperature of 1,000$^{O}$ F. Each boiler supplies a steam turbine generator rotating at 3,600 RPM and producing electricity at 22,000 volts. After the steam passes through the turbines it is condensed to water and used over again in the boilers.

The units have a combined gross electrical capability of 528,000 KW, most of which is distributed to Northern Indiana's customers. The remainder is used to operate plant auxiliaries.

Power from the generators is fed to Northern Indiana's 138,000 volt electrical lines through large transformers. These high voltage lines transmit the electricity to communities served by Northern Indiana in the northern third of Indiana.

Electrostatic precipitators (ESP) are used to control particulate emissions from the Bailly Station and collect fly ash. This fly ash and furnace bottom ash are the
E-27 two solid-waste streams from the station's boilers. These waste streams are exempted from the Resource Conservation and Recovery Act (RCRA) Subtitle C Hazardous Waste Regulations by 40 CFR Part 261.4(b)(4). They are also exempted from Indiana solid-waste regulations as long as they are used for approved beneficial purposes.

Currently the Bailly Station ash is sold to a broker for resale for other uses or for disposal out-of-state. Based on present estimated operating conditions, the approximate distribution of ash is as follows:

| | |
|---|---|
| Bottom ash to holding ponds | 60,000 tons/year |
| Fly ash to storage silo | 39,800 tons/year |
| Fly ash to stack emissions | 200 tons/year |

The Bailly Generating Station also has a wastewater discharge to Lake Michigan. The wastewater initially is directed through a series of on-site retention ponds and is recycled through the station on an as-needed basis. These discharges are regulated under a National Pollutant Discharge

Elimination System (NPDES) Permit covering the main outfall, intake deicing and other internal discharges. Typically 221 million gallons per day, consisting primarily of non-contact cooling water, are discharged to Lake Michigan (Appendix C). E-6 E-53

The station is operated under permits issued by the Indiana Department of Environmental Management. These permits are discussed in more detail and in relation to the AFGD system in Section 5, Regulatory Compliance. E-6

## 2.1.2 Purpose of Project

### 2.1.2.1 Objectives

The primary purpose of the project is to demonstrate that significant quantities of $SO_2$ emissions can be reduced at a cost of approximately 50 percent of the cost of currently available FGD systems. This will be accomplished by combining wet limestone AFGD technology, highly efficient plant operation and maintenance capabilities, and potential gypsum sales.

### 2.1.2.2 Project Justification

The AFGD system will contain several innovative features as shown in Table 2.1-1. These features have been pilot-tested or commercially applied to various degrees in similar applications, such as oil-fired plants or low sulfur applications. These features have not been combined in a single system in the United States. In addition, the AFGD system has not been operated on medium-to-high sulfur coals typical of the United States power plants that are suitable for retrofitting. The AFGD system is expected to remove greater than 90 percent of the $SO_2$ from the inlet flue gas. As part of the 20-year processing agreement with Northern Indiana, Pure Air will guarantee a 90 percent $SO_2$ removal E-7

TABLE 2.1-1: INNOVATIVE FEATURES OF AFGD SYSTEM VERSUS CONVENTIONAL FGD TECHNOLOGY

| Advanced Flue Gas Desulfurization Innovative Feature | Conventional Flue Gas Desulfurization Technology |
|---|---|
| 528 MW absorber module | 125 MW modules in U.S. |
| 20 ft/sec co-current high velocity absorber | 10 to 13 ft/sec counter-current flow |
| Single loop absorber vessel to absorb $SO_2$, react with limestone, and oxidize to gypsum | Dual loop with separate reaction and oxidation unit operations with complex chemistry and control |
| Air rotary sparger combines agitation and oxidation with low air volumes | Separate agitator and oxidation equipment resulting in higher air volumes |
| Wastewater Evaporation System demonstrates wastewater reduction capability | Produces a wastewater stream |
| Potential for no solid or liquid waste from process | Produces solid and/or liquid waste streams |
| 90 percent or greater $SO_2$ removal | Typically 90 percent $SO_2$ removal |
| Direct injection of pulverized limestone from offsite supplier | On-site limestone pulverization or grinding |
| No spare module | At least one spare module |
| On-line chemical process monitors | No on-line monitors |
| Operation and ownership by a chemical company, separate from power plant operation | Utility owns and operates, often with little chemical expertise |

efficiency for coals with a sulfur content of between 2.0 and 4.51 weight percent. The following discussion expands on the information provided in Table 2.1-1.

A. Absorber Module

This project proposes to install an absorber module to treat the flue gas from the Bailly Station. In the United States the typical practice is to install multiple modules of approximately 125 MW. The multiple module design is seen as providing a higher degree of reliability by most utilities. In addition, the U.S. Environmental Protection Agency's New Source Performance Standards (NSPS) require continuous operation of the FGD system during power-plant operations which leads utilities to install several smaller size modules with one spare. Thus, there is no United States experience with very large sized absorber modules. Large size modules (600 MW) have been successfully operated in Japan. This success indicates that this technological feature is ready for use in the United States on high sulfur coals.

B. Co-Current High Velocity Absorber

The proposed project incorporates a co-current rather than a counter-current flow absorber module. In addition, the flue gas velocity through the absorber is designed to be about twice as high as conventional FGD systems. Conventional processes use a counter-current spray tower design, where the flue gas velocity through the spray tower is typically in the range of eight to 10 feet per second at full load. The proposed co-current design is based on a flue gas velocity of 20 feet per second through the absorber at full load. This higher gas velocity has the effect of decreasing the absorber area requirement by 50 percent thus making it much more practical to retrofit this absorber in a restricted space. The co-current tower design

also has the advantage of a reduced pressure drop since both the liquid and the gas are flowing in the same direction rather than opposite each other.

Pure Air is of the understanding that the co-current design has been applied in the United States in only two instances. The Tennessee Valley Authority (TVA) tested a 10 MW co-current pilot plant FGD scrubber at the Shawnee Power Plant in Paducah, Kentucky. The test reports from this pilot plant were very encouraging and the co-current design was considered a successful test. On a commercial scale, Hoosier Energy in Indiana has installed and successfully operated eight 125 MW co-current absorber vessel FGD systems at their Merom Station since 1982. The design velocity for these vessels was 12 feet per second. Worldwide, Mitsubishi Heavy Industries (MHI) has installed over 12,000 MW of co-current absorber vessels. The high velocity design however, is a recent innovation resulting from pilot plant work at MHI's Hiroshima Technical Institute. From MHI's experience at Hoosier Energy, the higher gas design velocity for the proposed project represents a 67 percent increase over technology currently demonstrated.

C. Single-Loop Commercial Gypsum Production

E-8
E-13
E-18

The proposed process includes the design of a single-loop absorber vessel to absorb $SO_2$, (inlet concentration of 3,055 ppm dry) react with limestone, and oxidize to gypsum. This process differs from others that produce a commercial gypsum. In both the United States and worldwide, other processes employ a dual-loop quencher absorber vessel that relies on complex chemistry and control. Experience in the United States with this dual-loop process has met with limited success in both achieving $SO_2$ removal guarantees and producing a commercial gypsum product. Worldwide, the standard process for producing commercial

gypsum requires separate reaction and oxidation unit operations. The oxidation step is typically carried out in a separate vessel with a lower pH to enhance oxidation. The advantages of the single-loop process are simplicity of operation and cost savings in equipment.

Elsewhere, this MHI process has been applied at the Kuraray Company Ltd. Saijo Plant in Japan. This plant started operation in 1985 and operates on an industrial petroleum coke-fired boiler with a capacity of $3.5 \times 10^6$ cubic feet per hour. MHI supplied the FGD system which operates with an inlet $SO_2$ concentration of approximately 3,000 ppm. Successful application of the single-loop commercial gypsum process at this plant over the past four years indicates its technical readiness for demonstration on the proposed project. This process has not been applied either in the United States or on a coal-fired power plant elsewhere. As part of the 20-year processing agreement with Northern Indiana, Pure Air will guarantee the gypsum product purity within a range of coal sulfur content (as specified in Section 2.1.2.2) and normal boiler operation at the Bailly Generating Station. As noted in Section 2.1.2.2, $SO_2$ removal is also guaranteed at 90 percent by Pure Air. E-9

D. Air Rotary Sparger

The proposed project incorporates a unique air rotary sparger (ARS) system that combines the function of agitation and oxidation. The ARS is a specially designed agitator with a hollow shaft, arms and holes for air sparging. The rotation of this agitator results in the formation of fine air bubbles that increase the contact area between the air and slurry. One advantage of this design is the decrease in air requirements for oxidation to approximately 40 to 50 percent of that required by conventional air sparging systems. Another advantage is the

reduction of equipment required by combining both the agitator and air sparging equipment into one design. Conventional systems typically require a complex network of piping throughout the reaction tank to assure complete oxidaton of the absorbed $SO_2$ to gypsum. This unique rotary sparging system has been tested by MHI at their Hiroshima Technical Institute in Japan at a 50 MW scale test unit. The ARS is also being tested at the Hoosier Energy, Merom Station.

E. Wastewater Evaporation System

The proposed project will demonstrate a process step to pump part of the wastewater produced in the gypsum dewatering operation back to the flue gas upstream of the electrostatic precipitator for evaporation. Lime is used to neutralize the water stream. In existing installations where sufficient ductwork exists between the air heater and precipitator, this wastewater can be sprayed directly into
E-10 the ductwork for evaporation. At the AFGD design condition, the flow and composition of the dried solids which will be produced by the wastewater evaporation system are listed below:

| Compositon | Weight Percent |
|---|---|
| $CaCl_2$ | 73.1 |
| $Ca(OH)_2$ | 0.4 |
| $MgCl_2$ | 15.6 |
| $CaSO_4 \cdot 2H_2O$ | 9.4 |
| $CaF_2$ | 0.2 |
| Others | 1.3 |
| Flow, Lb/hr | 1181.3 |

These solids will be collected along with approximately 20,000 lb/hour of fly ash in the existing

electrostatic precipitators. Since the solids are removed at this point, they do not enter the downstream $SO_2$ removal equipment and do not affect $SO_2$ removal efficiency. This feature is described later in Section 2.1.3.2 and the water use for the design condition is provided in Figure 2.1-9. E-12

This unique feature is made possible through the development of a proprietary dual-fluid nozzle by MHI. This nozzle produces a very fine droplet distribution with a minimum of droplets in the larger size ranges typically found in other dual-fluid nozzles.

The wastewater evaporation system technology has been demonstrated by the Kansai Electric Power Company Kainan Station in Japan for the past two years. This plant employs a commercial grade gypsum FGD system supplied by MHI on a 125 MW oil-fired boiler. The $SO_2$ content of the flue gas is approximately 500 ppm with a 90 percent reduction by the FGD system. The success of this smaller unit and the extensive development work of the spray nozzles required for humidification indicate that this feature is ready for application to the 500 to 600 MW level. This wastewater evaporation system has never been demonstrated at these levels, in the United States or on a coal-fired boiler worldwide. The scale-up of the wastewater evaporation system from the work at Kainan Station will not affect the performance of the downstream $SO_2$ removal equipment. The sulfur balance using the design coal for the AFGD (4.51 weight percent sulfur) and 90 percent $SO_2$ removal efficiency is provided in Figure 2.1-7 in Section 2.1.3.2; whereas, the chloride balance is shown in Figure 2.1-8, and water use and gas temperature are shown in Figure 2.1-9. E-14 E-11

E-15 E-16

F. Potential for No Solid or Liquid Waste

The proposed AFGD system will demonstrate the potential for producing no solid or liquid waste from any portion of the process. Most operating FGD processes in the United States produce a solid-waste stream consisting of scrubber sludge and a mixture of fly ash and limestone which is landfilled as a U.S. Environmental Protection Agency, Resource Conservation and Recovery Act exempt or non-hazardous waste. The few regenerable FGD processes in the United States producing gypsum, sulfur, or sulfuric acid have a liquid wastewater discharge in order to control contaminants in the commercial by-product. The proposed system, through the production of commercial grade gypsum and the use of the wastewater evaporator system, will demonstrate the potential for producing less liquid or less solid waste from the process. Of all the FGD systems operating in the world today, the proposer is aware only of Kansai Electric Power Company's Kainan Station using the wastewater evaporator system and producing no solid- or liquid-waste streams. This process feature has never been demonstrated in the United States or on high sulfur coal applications.

E-15

E-16

G. High $SO_2$ Removal

The proposed AFGD system will be designed to operate at an $SO_2$ removal efficiency of 90 percent with an inlet flue gas concentration of $SO_2$ of 3,055 ppm dry. In the United States, a 90 percent $SO_2$ removal level is the accepted technology and corresponds to the current limits of the New Source Peformance Standards. Although some FGD systems have been nominally designed for an $SO_2$ removal level of 95 percent (City of Muscatine, IA), consistent achievement of this high level has never been demonstrated. Other utilities (Basin Electric - Laramie River) have reported $SO_2$ removal levels in this range on a low sulfur coal, but again not on a

E-8 E-13 E-15

consistent basis. High $SO_2$ removal designs have recently been installed in Germany and are currently coming into operation. These designs generally have 95 percent or greater $SO_2$ removal, but are typically on a low sulfur coal (1-percent level). In Japan, some systems have achieved a 90 to 95 percent $SO_2$ level, but again on lower sulfur coals. Thus, high $SO_2$ removal has never been demonstrated consistently in a cost-effective manner either in the United States, or on a high sulfur coal. AFGD performance guarantees have been described earlier in this section. E-17

H. Direct Injection of Pulverized Limestone

The proposed AFGD system is designed to utilize pulverized limestone from a limestone supplier and directly inject this pulverized limestone into the absorber vessel based on process demand. This process feature eliminates the need for on-site limestone unloading equipment (mechanical conveyor and bucket elevators), bulk limestone storage, limestone ball mills, and the limestone slurry tank agitator and pump. This equipment would be replaced by pulverized limestone storage silos and a blower for pneumatic conveying to the process.

The conventional United States practice is on-site wet ball mill grinding in a closed circuit loop with cyclone classifiers in order to produce the particle size distribution required for the process. The limestone is added to the process by means of a 20 to 30 percent slurry based on process demand. Conventional foreign practice both in Japan and West Germany is to purchase pulverized limestone with on-site slurrying. The proposed design is aimed specifically at the retrofit market where the economics for a 15- to 20-year retrofit plant are different from those of a 30- to 40-year new grass roots plant. On a shorter plant life, it makes economic sense to avoid the expensive capital

cost of grinding equipment, and instead purchase pulverized limestone directly from a supplier. The reduced equipment requirement also enhances the ability to retrofit other existing plants.

On a worldwide basis, the only plants of which Pure Air is aware that both purchase pulverized limestone and directly inject pulverized limestone to the process are the West German Veba Kraftwerke Ruhr AG's seven FGD units. These are 370 MW plants using West German brown coal. The earliest one started operation in November 1985. The FGD systems were designed by MHI to produce a commercial grade gypsum with an inlet $SO_2$ concentration of 1,050 ppm dry and an $SO_2$ removal efficiency of 95 percent. This innovative feature has never been demonstrated in the United States at the 500 to 600 MW
E-18 level or on a high sulfur coal. Additionally, the proposed AFGD system will have an inlet $SO_2$ concentration of 3055 ppm dry.

I. No Spare Module

The proposed demonstration project does not intend to include a spare module in its design while maintaining a high availability of the AFGD system for the Bailly Station. The current United States practice is to incorporate at least one spare module and sometimes two to assure the overall high availability of the FGD system to the utility. This design practice, to include a spare module, is essentially directed by the current New Source Performance Standards in effect
E-19 since 1978. Air emissions from the AFGD system and the Bailly Station are discussed in Section 4, Consequences (Impacts) of the Project and Section 5, Regulatory Compliance.

On a worldwide basis, the common practice is to design the FGD system with no spare module. However, United

States utilities are very reluctant to accept this design feature until successfully demonstrated in this country. Therefore, Pure Air believes that the demonstration of an AFGD system that includes no spare module is an essential part of the proposed process. The cost advantages of the elimination of a spare module are significant.

J. Continuous Chemical Process Control Monitors

The key to the operability and availability of the overall AFGD chemical process is the inclusion of continuous monitors to measure major process parameters. These parameters include chloride, sulfite and carbonate concentrations. The conventional United States practice regarding these three chemical constituents has been to ignore them totally on a continuous basis since no continuous monitoring devices have been available. Chloride concentration is sometimes monitored on a grab sample basis for systems that produce a saleable gypsum product. MHI has developed a continuous monitoring capability that has been in service to a limited degree on recent FGD systems supplied in Japan. The monitors are commercially available, but have never been tested in either the United States or on a high sulfur coal-fired FGD facility.

K. Own and Operate AFGD System by Chemical Company

The proposed project is structured so that the AFGD system will be designed, constructed, owned, operated, and maintained by a company separate from Northern Indiana. Although the system will be operated on utility land, all operation and maintenance personnel will be supplied by a separate chemical company (Air Products and Chemicals, Inc.), and the responsibility for the AFGD system operation will be totally separated from that of the power plant.

The conventional practice worldwide is for the utility to own and operate the FGD system. Since the utility is ultimately responsible for all emissions from its power plant, it has remained accepted practice for the utility to own and operate the FGD system. The advantage of a separate operator for the AFGD system is that Air Products and Chemicals, Inc. has the technical expertise to operate the AFGD system, both to minimize the operating cost and to
E-20 assure a high availability to Northern Indiana. However, Northern Indiana is ultimately responsible for $SO_2$ excursions. The air emission operating permit will be in Northern Indiana's name.

Pure Air believes the ownership and operation of an FGD system by a separate company has never been proposed or put into practice anywhere in the world.

2.1.2.3 Economics

The costs developed for the proposed project represent a savings of approximately 50 percent in capital and 50 percent in operating costs over a conventional forced oxidation FGD system applied as a retrofit to an existing plant. Tables 2.1-2 and 2.1-3 summarize the capital and operating cost savings of the proposed AFGD system.

## 2.1.3 Engineering Description of the Proposed Action

### 2.1.3.1 Description of Project Phases

The AFGD project will take 81 months to complete from selection with an anticipated July 1992 on-stream date as illustrated in Figure 2.1-3. Pure Air will conduct the technology demonstration project in three phases.

TABLE 2.1-2: CAPITAL COST SAVINGS FEATURES OF THE AFGD SYSTEM[1]

| AFGD Feature | Cost Savings |
|---|---|
| 1. 528 MW Absorber Module | A single module represents approximately a 10-percent cost savings over a multi-module design. |
| 2. High Velocity Absorber | The design velocity of 20 feet per second for the co-current scrubber as compared to 10 feet per second for conventional spray towers results in an absorber area which is 50 percent of conventional and a flat plate perimeter area savings of approximately 30 percent. |
| 3. Single Loop Absorber Vessel | Being able to accomplish all process steps (absorption of $SO_2$, reaction with limestone, oxidation to gypsum) in a single vessel represents a significant savings over commercially available systems. Other conventional designs include a two-loop process or a separate external oxidation step. |
| 4. Air Rotary Sparger | Combining the tank agitation and oxidation into one piece of equipment eliminates the cost of the complex network of air sparger piping normally required in other conventional systems. |
| 5. Direct Injection of Pulverized Limestone | Purchase and injection of pulverized limestone eliminates the need for on-site wet grinding normally accomplished by ball mills. Typical retrofits with 20 years of life or less would benefit from this cost saving feature. |

TABLE 2.1-2: (Continued)

| AFGD Feature | Cost Savings |
|---|---|
| 6. No Spare Module | The ability to maintain high availability with only a single module is also an essential part of the cost saving features of the proposed technology. Elimination of a spare absorber module represents a significant cost saving. |

Note to Table 2.1-2:

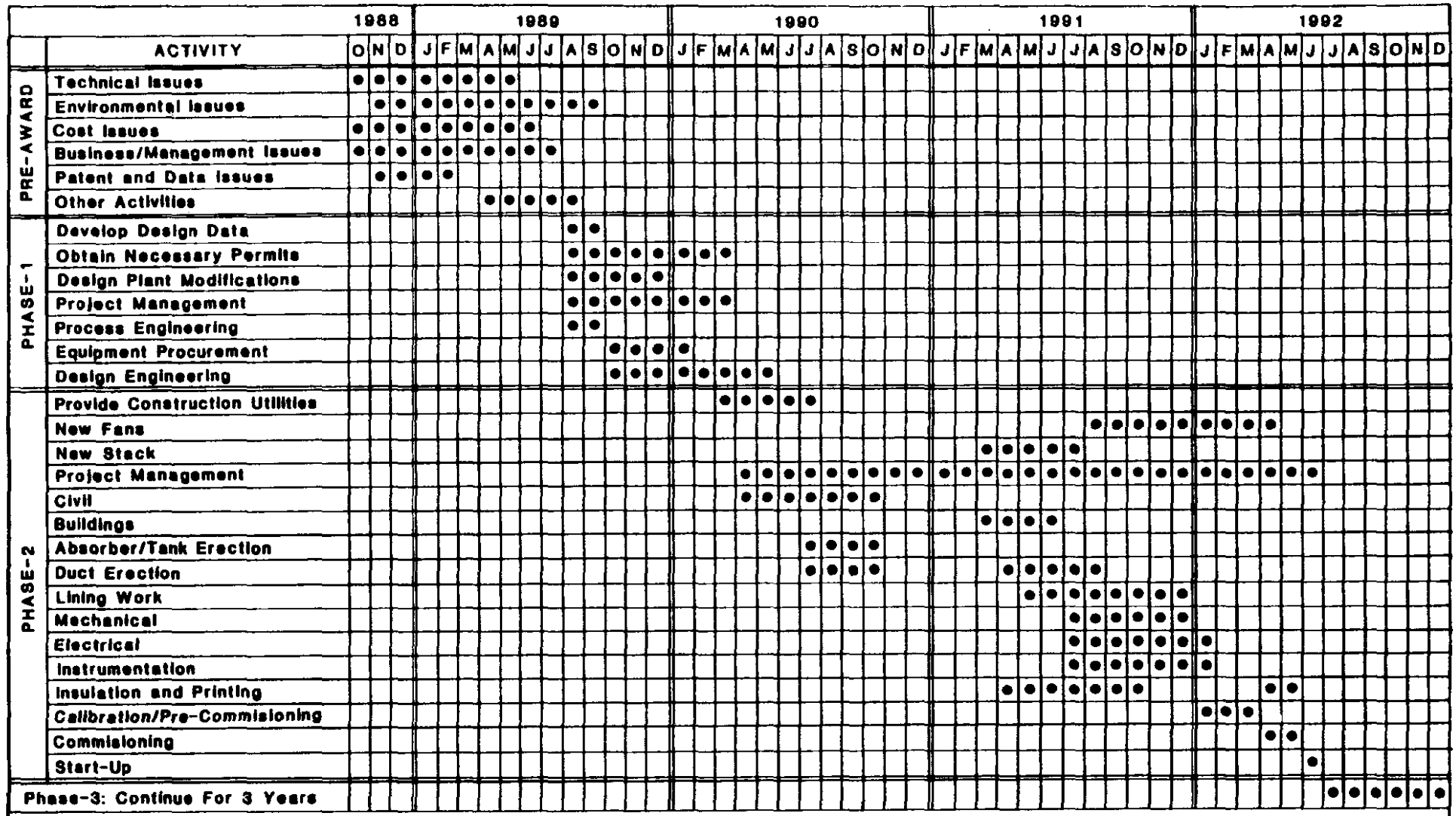
(1) Capital cost savings for items 3 through 6 are estimated to be at least 10 percent over conventional FGD systems.

TABLE 2.1-3: OPERATING COST SAVINGS FEATURES OF THE AFGD SYSTEM(1)

| AFGD Feature | Operating Cost Savings |
|---|---|
| 1. Commercial Gypsum | Commercial gypsum represents an $8 or more per ton credit versus approximately a $10 liability for conventional waste-producing systems, for an overall differential of $18 per ton savings for the AFGD system. |
| 2. Co-Current Tower Design | The co-current absorber tower inherently has a lower pressure drop than conventional counter-current spray towers. This savings is somewhat offset by the higher velocity used in the co-current design. |
| 3. Air Rotary Sparger | The air rotary sparger has a higher efficiency of oxidation than a conventional system. Approximately 50 percent less air is required for oxidation with the air rotary sparger than in conventional sparging systems. |
| 4. Single Module | Reduction in the number of equipment items will reduce operation and maintenance costs over competing multi-module systems. |

Note to Table 2.1-3:

(1) Operating cost savings for each item are estimated to be at least 10 percent over conventional FGD systems.




Pure Air

a joint venture company

ADVANCED FLUE GAS DESULFURIZATION

Proposed Project Schedule

Figure 2.1-3

Phase 1: Design and Permitting

This initial phase will culminate in the detailed design of the AFGD system for the Bailly Station. A program plan will be prepared for the equipment construction and demonstration testing.

Phase 2: Construction and Startup

This phase will begin during the second half of Phase 1 and will last 27 months. Following DOE approval, the AFGD equipment will be installed and checked out at the Bailly Station. As presently envisaged, project related structures will be constructed at grade. Building foundations will not extend more than six feet in depth. The stack will be erected on a piled foundation.

Phase 3: Operation, Data Collection, Reporting and Disposition

Phase 3 will begin at the completion of Phase 2 and will last 36 months. Following DOE approval, the AFGD unit will be tested for three years over a range of conditions. All data and test results will be compiled into a final report that will be made available to DOE.

2.1.3.2 Description of Process

The AFGD system will be a blend of new innovative process technologies and existing process technologies (updated, improved upon and/or scaled upwards from what is seen at existing plants). The AFGD system also will be the first-time demonstration of various process features on high sulfur United States coals, and the integration of all of these various process components into a single scrubbing process.

The final design of the AFGD system will be based on an Illinois/Indiana basin coal having the following ultimate analysis:

| Component | Percent by Weight |
|---|---|
| S | 4.51 maximum |
| C | 58.81 |
| H | 4.46 |
| $H_2O$ | 13.50 |
| N | 1.14 |
| Cl | 0.25 maximum |
| Ash | 10.25 |
| O | 7.08 |
| HHV | 10,982 Btu/lb |

E-21
E-68

The AFGD design is based upon this coal, and the system is capable of processing flue gas from coals which contain between 2.0 and 4.51 weight percent sulfur and less than 0.25 weight percent chloride. Coals outside of these parameters cannot be burned at the Bailly Generating Station within the operating guarantees of the AFGD system. The design parameters were established to show the ability of the AFGD process to clean flue gas to stringent emission standards. Northern Indiana's current coal purchasing practices and anticipated future purchasing plans indicate that a coal well within the design parameters will be utilized. The expected coal quality is anticipated to have the following characteristics:

E-7
E-68

| Component | Minimum | Average | Maximum |
|---|---|---|---|
| Sulfur (%) | 2.30 | 3.10 | 3.87 |
| Moisture (%) | 5.0 | 10.7 | 15.0 |
| Ash (%) | 8.0 | 10.0 | 13.0 |
| HHV (Btu/lb) | 10,408 | 11,510 | 13,000 |

Since the AFGD system design accommodates a coal with a greater sulfur content than the range indicated above, and a guaranteed 90 percent removal efficiency, the likelihood of a successful demonstration with respect to this aspect of the project is maximized. E-17

The location of the overall AFGD system to the Bailly Station is shown in Figure 2.1-4 with the currently proposed plot plan illustrated in Figure 2.1-5. Component balances at design conditions for the following species, $SO_2$, $CaSO_4 \cdot 2H_2O$, $CaCO_3$, and $Cl^-$ are presented in Figures 2.1-6 through 2.1-8, respectively. Temperature and water-use data appear in Figure 2.1-9. E-5 E-8 E-13 E-18 E-22 E-24 E-25 E-52 E-60

The AFGD system is divided into four sections:

A. Flue Gas Ducting and Fans Section
B. Limestone Feed and Handling Section
C. $SO_2$ Removal Unit Section, and
D. Gypsum By-Product Handling Section.

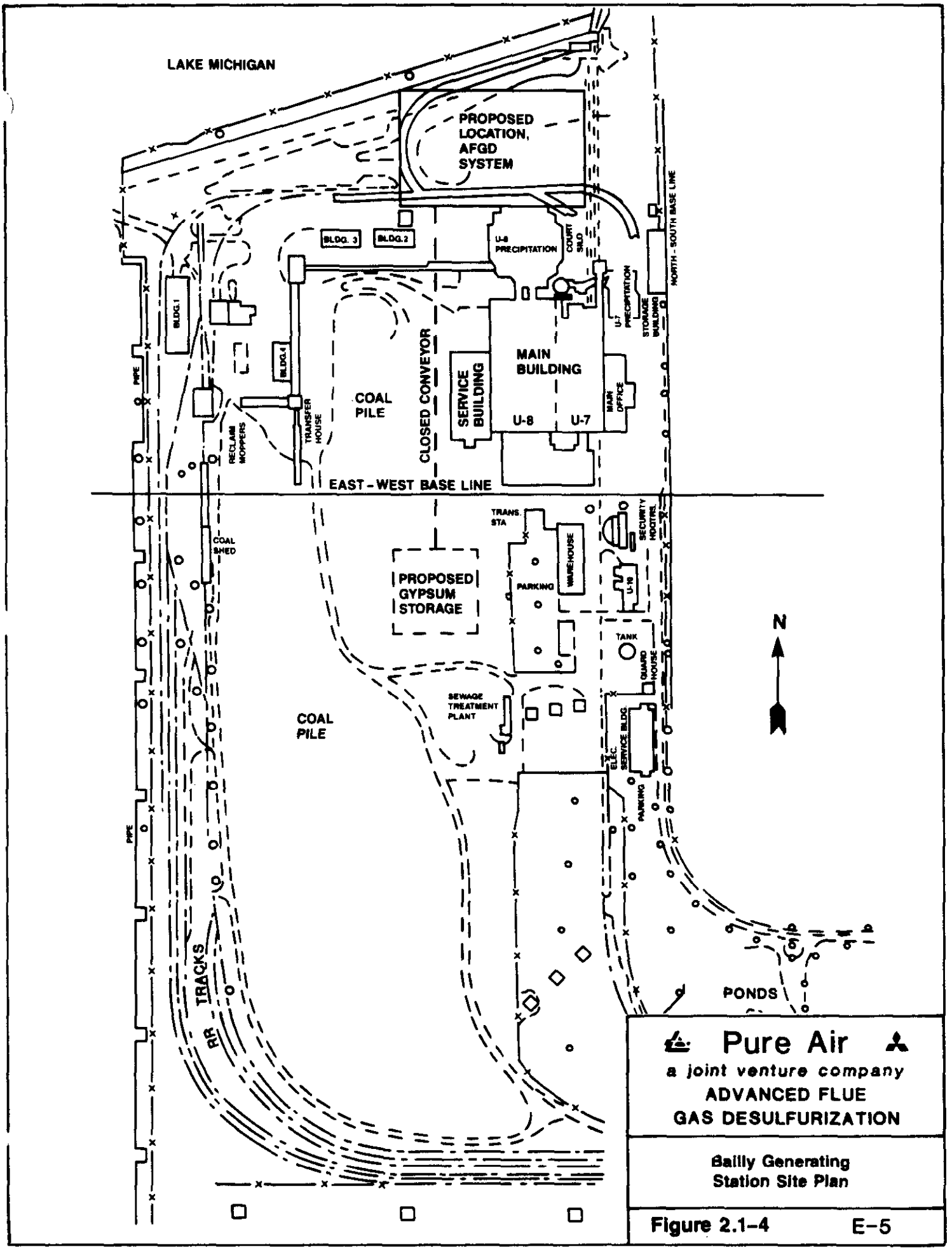
These sections are described below.

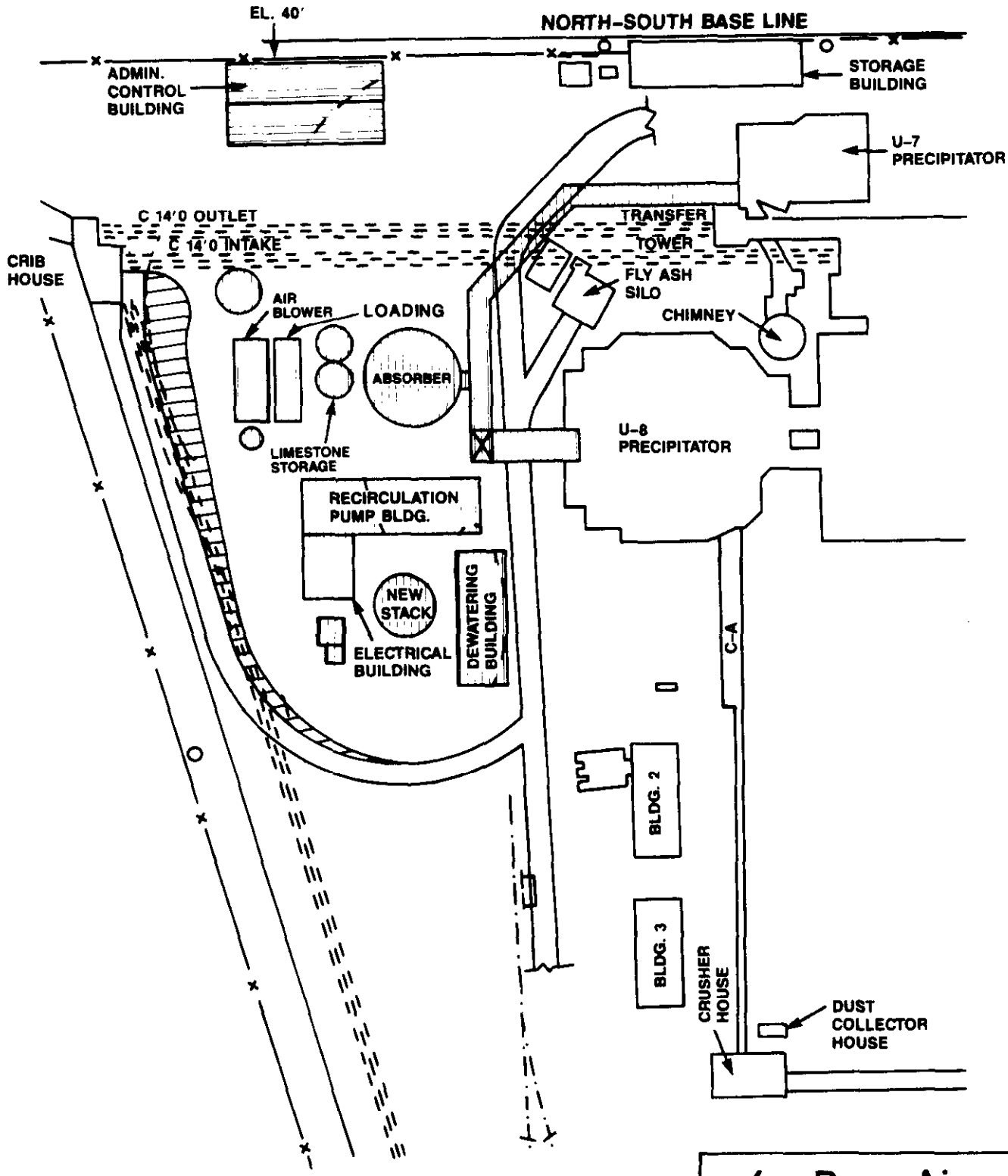
A. Flue Gas Ducting and Fans Section

The flue gas ducting and fans section directs flue gas from the existing Bailly Generating Station electrostatic precipitators (ESP) to the AFGD system $SO_2$ removal section. Also, this section receives wastewater from the wastewater evaporation system (WES) upstream of the ESP.

B. Limestone Feed and Handling Section

The AFGD system will receive purchased pulverized limestone from a limestone supplier. The limestone will be


LAKE MICHIGAN
PROPOSED LOCATION, AFGD SYSTEM
BLDG. 3
BLDG. 2
U-8 PRECIPITATION
COURT SILO
BLDG. 1
BLDG. 4
PIPE
RECLAIM HOPPERS
TRANSFER HOUSE
COAL PILE
CLOSED CONVEYOR
SERVICE BUILDING
MAIN BUILDING
U-8
U-7
MAIN OFFICE
U-7 PRECIPITATION
STORAGE BUILDING
NORTH - SOUTH BASE LINE
EAST - WEST BASE LINE
TRANS. STA
SECURITY HOUSE
COAL SHED
PROPOSED GYPSUM STORAGE
PARKING
WAREHOUSE
U-10
TANK
GUARD HOUSE
N
SEWAGE TREATMENT PLANT
COAL PILE
ELEC. SERVICE BLDG
PARKING
PIPE
RR TRACKS
PONDS
Pure Air
a joint venture company
ADVANCED FLUE GAS DESULFURIZATION
Bailly Generating Station Site Plan
Figure 2.1-4
E-5



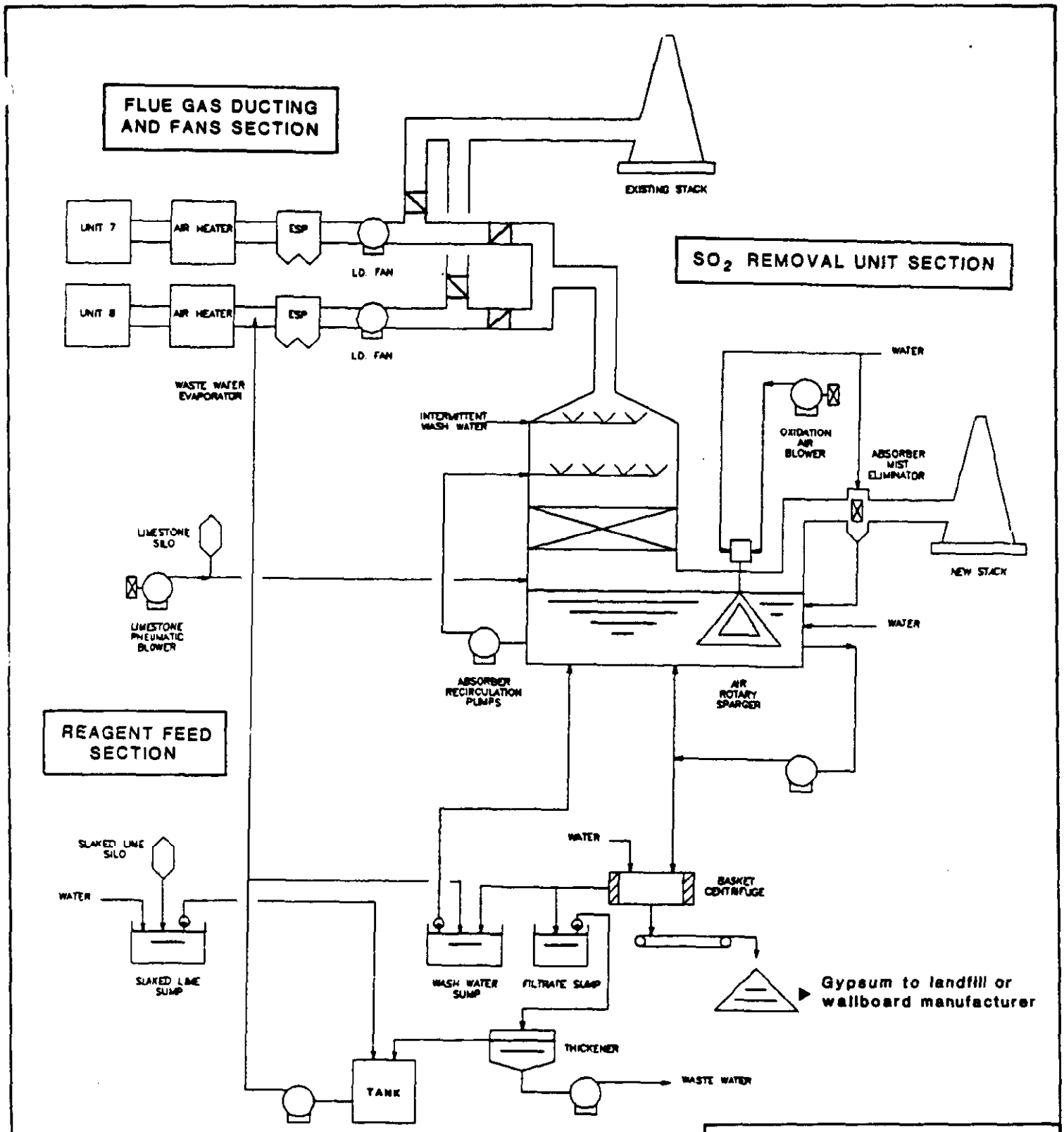

**Note: New construction is indicated by shaded areas on figure.**

N

Pure Air
a joint venture company
ADVANCED FLUE GAS DESULFURIZATION

Proposed AFGD System
Plot Plan

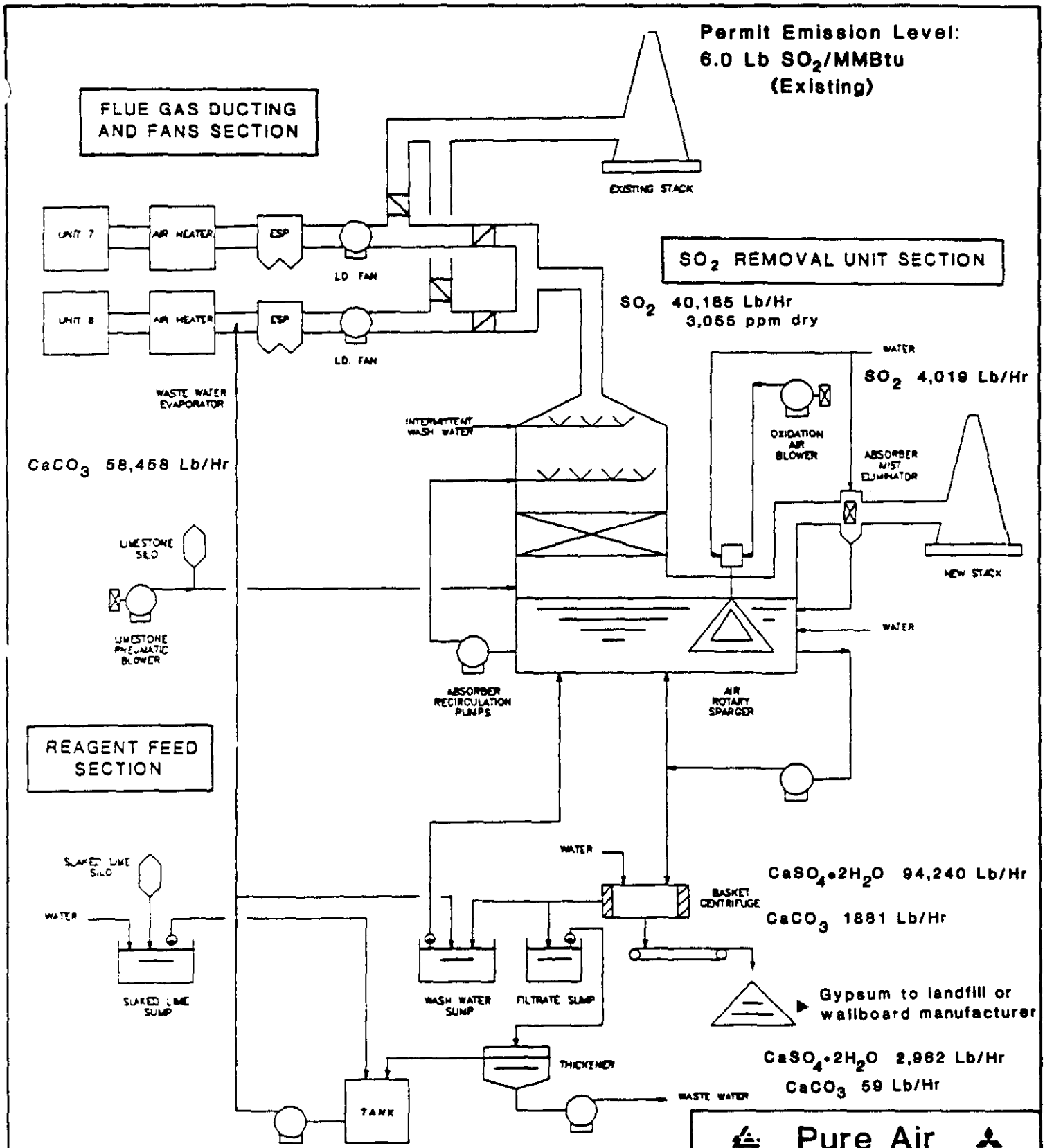
Figure 2.1-5 E-23




Pure Air
a joint venture company
ADVANCED FLUE GAS DESULFURIZATION

Process Flow Schematic

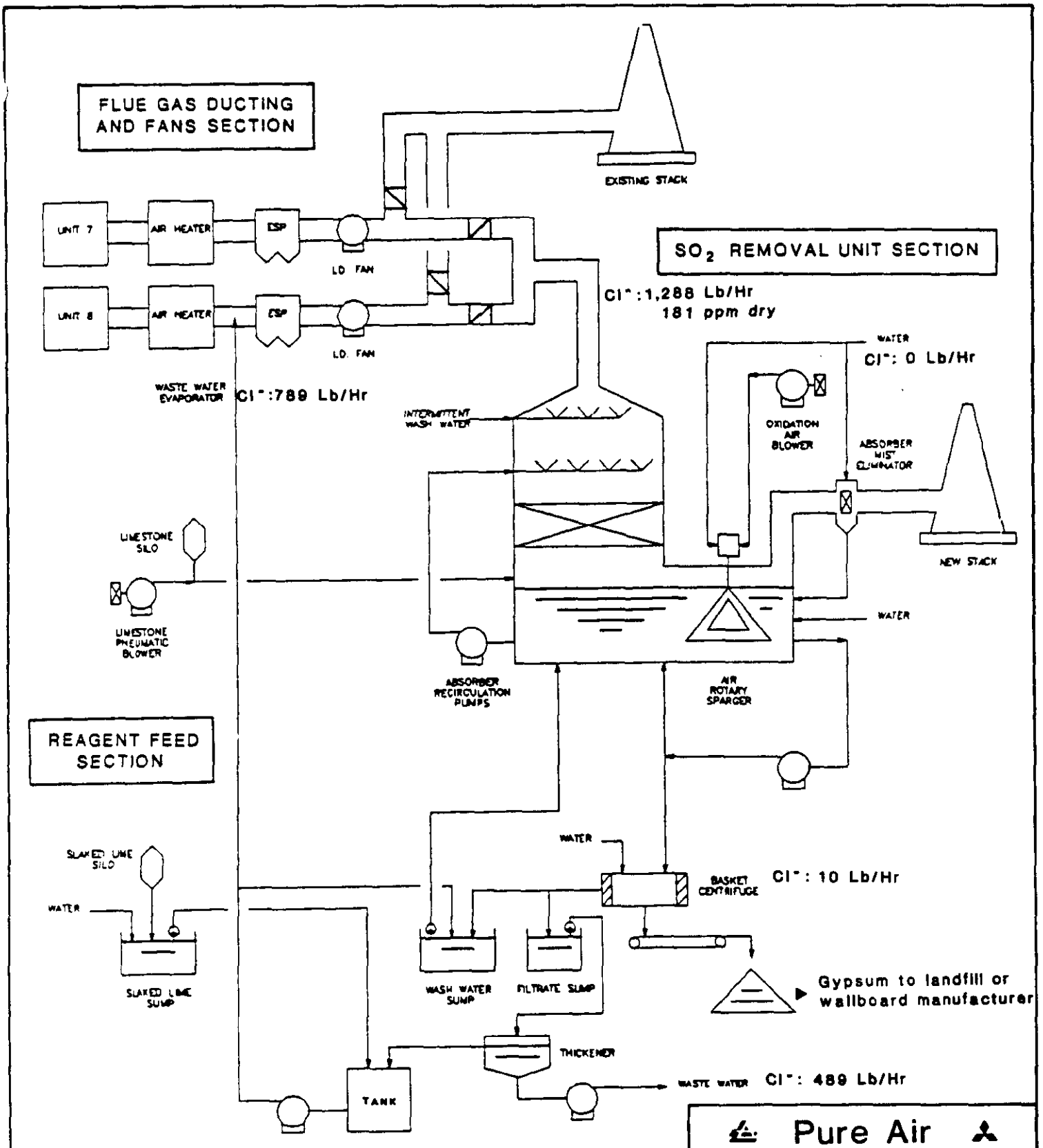
Figure 2.1-6 E-60




**Pure Air**
a joint venture company
ADVANCED FLUE GAS DESULFURIZATION

Sulfur, Gypsum and Limestone Balance: AFGD Design Condition

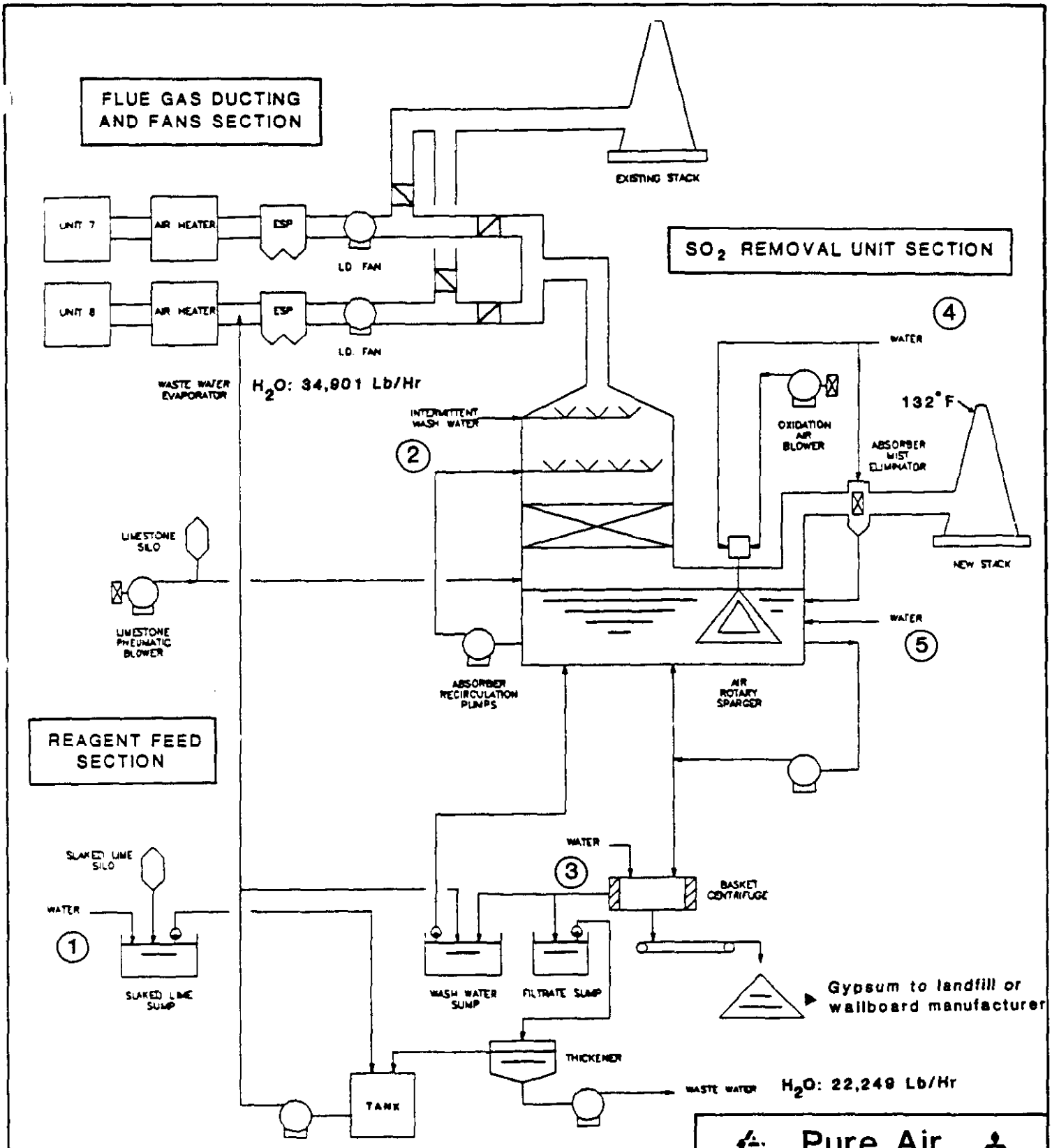
Figure 2.1-7 E-22, 52




Pure Air
a joint venture company
ADVANCED FLUE GAS DESULFURIZATION

Chloride Balance:
AFGD Design Condition

Figure 2.1-8 E-22, 52




Pure Air
*a joint venture company*
ADVANCED FLUE GAS DESULFURIZATION

Water Use and Gas Temperature: AFGD *Design Condition*

Figure 2.1-9 E-11, 22

pulverized to 95 percent less than 325 mesh. Limestone will be received in pneumatic trailers and pneumatically unloaded into limestone storage silos. The total limestone storage capacity will be three days. The pulverized limestone will be fed from the storage silos into a pneumatic conveying system, that will feed the limestone directly into the absorber hold tank. The limestone feed rate corresponds to a E-24
nominal 1.05 Ca/S molar ratio (based on the $SO_2$ removed) to achieve 90 percent or higher $SO_2$ removal, and results in 10 E-25
percent or less of the station's $SO_2$ being emitted to the atmosphere, and by-product gypsum purity.

Hydrated lime will be received by truck, pneumatically conveyed to a small silo and added directly to the wastewater tank by gravity. The hydrated lime is added to the wastewater stream to raise the pH of the wastewater.

C. $SO_2$ Removal Unit Section

The flue gas from the flue gas ducting and fans section will enter the $SO_2$ removal unit section absorber at its top where it will be quenched with recirculating slurry. This "wet/dry" interface will be washed intermittently with fresh water to avoid the formation of any deposits.

The single 100 percent absorber module will be a co-current grid packed tower. The absorber tower and reaction tank will be integrated to reduce equipment and space requirements. The co-current design will allow a gas velocity as high as 20 feet per second, which accounts for the inherent compact size of the absorber.

The grid packing will provide a large surface area for liquid/gas contact which enhances overall $SO_2$ removal efficiency. The absorbed $SO_2$ will be partially oxidized by the oxygen in the flue gas as it passes through the

absorption grids. Complete oxidation will be accomplished in a reaction tank by using a newly designed air rotary sparger. After flowing downward through the absorption grids, the flue gas will turn, pass over the reaction tank, and turn upward towards the mist eliminator located vertically in the outlet ducting. The recirculation slurry is separated from the gas by the mist eliminator and is collected in the reaction tank.

The absorber reaction tank will be designed to hold an adequate liquid volume to ensure efficient utilization of the limestone, desupersaturation of calcium sulfate, and oxidation of the remaining calcium sulfite. The air rotary sparger system is an innovative mixer that injects air into the reaction tank and prevents solids from settling out in the reaction tank.

The chemistry of absorbing the $SO_2$ from the flue gas and converting it to gypsum will be as follows:

$$SO_2 + H_2O \longrightarrow H_2SO_3$$

$$H_2SO_3 \longrightarrow H^+ + HSO_3^-$$

$$(H^+ + HSO_3^- + 1/2\ O_2 \longrightarrow 2H^+ + SO_4^=)$$

E-55

$$(2H^+ + SO_4^= + CaCO_3 + H_2O \longrightarrow CaSO_4 \cdot 2H_2O + CO_2)$$

The $SO_2$ will be absorbed into $H_2O$, then dissociates from $H_2SO_3$ to $H^+$ and $HSO_3^-$. A portion of the $HSO_3^-$ will be oxidized by oxygen in the flue gas and converted to $H_2SO_4$. Calcium carbonate in the slurry will neutralize a portion of the $H_2SO_4$, helping to balance the slurry pH.

All remaining $HSO_3^-$ in the slurry will be oxidized by air from the air rotary sparger and converted to $H_2SO_4$. It will then be neutralized with $CaCO_3$ to form $CaSO_4 \cdot 2H_2O$.

The gypsum slurry will be drawn off to maintain a 20 percent to 25 percent (by weight) slurry content in the absorber reaction tank. Two 100 percent absorber bleed pumps will transfer the slurry from the absorber to the gypsum slurry tank for further processing. A two-stage Chevron type mist eliminator will be located vertically in the outlet duct leading from the absorber tank. Entrained mist reaching the mist eliminator will be minimized by a horizontal run between the absorber tank and the eliminator. Collected entrainment will be returned to the absorber tank. A washing spray header system will be installed in front of the mist eliminator elements to wash down intermittently the element surface and avoid any buildup of deposits. After passing through the mist eliminators, the scrubbed flue gas will exit the outlet duct into the exhaust stack for discharge to the atmosphere.

D. Gypsum By-Product Handling Section

In the gypsum by-product handling section two absorber bleed pumps will batch transfer the gypsum slurry from the $SO_2$ removal unit section into basket centrifuges which will reduce it to a dewatered cake containing 8 to 10 percent moisture by weight. A portion of the filtrate water from the centrifuge operation will be returned to the absorber vessel as process water. The wastewater from the centrifuge operation will be sent to the existing Bailly Station wastewater ponds for disposal. The gypsum cake will be transferred by enclosed conveyor to an enclosed location within the station where it can be taken to a wallboard manufacturer or hauled offsite for landfilling.

During the 3-year demonstration phase, a portion of the filtrate water from the centrifuge operation will be sent to the WES for disposal. In the WES, wastewater from the

absorber system will be fed to a pH adjustment tank. In the tank, wastewater will be neutralized by hydrated lime. Impurities in the wastewater such as a chloride and sulphate ion will be stabilized by the neutralization so that these impurities in liquid phase do not evaporate. After pH adjustment, wastewater will be pressurized by the wastewater spray pump and pumped to the wastewater evaporators located upstream of each ESP in the flue gas ducting and fans section.

Wastewater will then be atomized by a pressure nozzle in the duct and mixed with the flue gas. Wastewater will be evaporated to dryness through the evaporator. After evaporation, the flue gas with dry solids will be ducted to join the main flue gas stream at the evaporator outlet and the dry solids will be removed by the ESP. In those circumstances when the WES is not in operation, the wastewater will be sent to the existing pond system within the Bailly Station.

The potential impact and regulatory issues
E-26 associated with materials produced in the gypsum by-product handling section are discussed in Section 4, Consequences (Impacts) of the Project and Section 5, Regulatory Compliance.

2.1.3.3 Hazardous Releases

There are no hazardous releases from the AFGD process. The four potential sources of hazardous releases in any process are feedstocks, chemicals, wastes, and process drains. These four potential sources of hazardous releases are discussed below with respect to the AFGD system.

A. Feedstocks

The only reagent feedstocks to the process are limestone and hydrated lime; no organics are used. Limestone ($CaCO_3$) is a naturally occurring mineral that is mined from the earth and is classified as non-hazardous. Hydrated lime [$Ca(OH)_2$] is produced by calcining limestone to quicklime (CaO) and then hydrating the quicklime in an atmospheric hydration system. Hydrated lime is also classified as non-hazardous.

B. Chemicals

There are no chemicals used in the AFGD process other than the limestone and hydrated lime feedstock.

C. Wastes

The only waste stream from the process is the high-chloride wastewater stream from the gypsum cake washing cycle. This wastewater stream also contains dissolved calcium and magnesium salts, and some small amounts of fly ash and inerts from the limestone and hydrated lime feedstock. None of the components of this wastewater stream is considered to be hazardous based on an examination of U.S. Environmental Protection Agency and Indiana Department of Environmental Management regulations for classifying waste materials. E-27

The saleable by-product that is generated by the process is a high purity gypsum suitable for producing a wallboard building material. There is the potential for producing some quantity of gypsum that would not meet the wallboard manufacturer's specification for free-water, chlorides, calcium carbonate or fly ash content. This off-specification gypsum can generally be blended back into

the specification gypsum amounts and still meet wallboard specifications. In some instances this lower-quality gypsum can be sold to cement manufacturers. In a worst-case scenario, this non-hazardous, off-specification gypsum would be commercially landfilled in an existing landfill, if
E-28 necessary. The landfill would be selected based on discussions with the Indiana Department of Environmental Management and subsequent negotiations with the selected landfill and/or contract hauler.

E-28 All major wallboard producers in North America who account for over 95 percent of the wallboard produced in North America have been introduced to this project. These producers have expressed interest in purchasing by-product gypsum. The AFGD system will produce between 175,000 and 250,000 tons of gypsum per year depending on operating rates and sulfur content of the coal burned. This range is attractive to wallboard producers for a medium-sized wallboard plant.

Initially, the Indiana Office of Solid and Hazardous Waste Management (OSHWM) will consider the gypsum, whether on-specification or off-specification, as a waste from an industrial pollution control source. The OSHWM will evaluate/classify the gypsum based on the results of analyses from bench tests. Within a 15-mile radius of the Bailly Generating Station, there are currently three landfills that could potentially be used for by-product gypsum disposal.

E-28 Pure Air is facilitating negotiations between Northern Indiana and wallboard producers. The successful producer will be requested to install an on-site covered gypsum storage building to control fugitive emissions. (Probable size is 5-days' storage or approximately 5000 tons.) The gypsum conveyor from the AFGD system to storage is fully covered to eliminate fugitive emissions.

In the event the main conveyor has mechanical problems, an emergency stackout conveyor and building will be installed near the AFGD system for 24-hour storage (approximately 1000 tons). The building and conveyor will be covered to control fugitive dust and potential runoff. E-31

Both the main storage and emergency stackout buildings will hold gypsum until transported to wallboard producers or a landfill. E-31

D. Process Drains

Water spilled from the AFGD system will be directed to process drains. These drains will connect to a central collection sump where the process water will be collected and added back to the absorber hold tank as needed, since its quality will be similar to material in the absorber. This process water is considered to be non-hazardous and will be contained within the process. Also, it will not change or impact removal of $SO_2$ by the AFGD system. E-29

2.1.3.4 Project Source Terms

This section characterizes the source terms of the AFGD technology demonstration project. Source terms can be divided into the categories of project resource requirements and project discharges. The potential impacts of the project source terms are discussed in Section 4, Consequences (Impacts) of the Project. E-31

A. Project Resource Requirements

The resource requirements for the project can be segregated into the following five areas and are discussed below:

a. Utilities
b. Land
c. Labor
d. Materials
e. Transportation

a. Utilities

The utilities listed below will be required for operation of the proposed AFGD system at the Bailly Station. Northern Indiana will provide these utilities to the boundary limits of the AFGD facility for Pure Air to tie into the AFGD facility.

| Utility | Estimated Flows (Gal/Min) | Service |
|---|---|---|
| Process Water | 880 | Continuous |
| Cooling Water | 475 | Continuous |
| Fire Protection Water | 1,000 | Intermittent |
| Pump Seal Water | 175 | Continuous |
| Potable Water | 70 | Intermittent |
| Quench Water | 5,800 | Intermittent |

In addition, approximately 7.6 MW of continuous power will be supplied to the AFGD facility.

During the construction phase of the AFGD system, construction power and some utilities will be provided to the location of the system and to the tank/vessel fabrication area. These construction requirements consist of the following:

1. Power - 480 volt continuous
2. Potable (drinking) water - 70 GPM

As previously mentioned, the Bailly Station is located adjacent to Lake Michigan. Presently lake water is extensively used in the generating facility and readily available in quantities and qualities for use in the proposed AFGD facility's day-to-day operation.

Based on preliminary design estimates of water requirements stated above, it is envisaged that process water, pump seal water, cooling water and quench water will be supplied from water within Lake Michigan. Considering the plentiful supply of Lake Michigan water for the proposed AFGD system operating requirements, constraints limiting its use are not projected for the long-term future.

Fire protection water will be used strictly to supply water to various fire protection devices (automatic sprinklers and hand-held fire extinguishing equipment) to protect AFGD equipment from catastrophic failure resulting from fire damage. Northern Indiana will provide sufficient water for this purpose from the Bailly Station's high head service water system. Bailly Station's high head system can be supplied from two independent water sources, the low head and circulating water systems. The supply for both of the systems is Lake Michigan water. No treatment of this water is required prior to use. Potable water will be provided by tying directly into an existing potable water line located in the generating station. Potable water from on-site sources will be installed to support the construction phase of the AFGD facility.

The 480-volt construction power will be supplied to support construction of the facility and will originate from a spare 480-volt breaker located inside the Bailly Station. Direct buried cable will be supplied from the breaker to the AFGD boundary limits. Subsequent to construction this cable

will be abandoned in place. To support the power requirements for operation of the AFGD facility, an independent feed will emanate from the Bailly Station's 34 kV yard.

Two new transformers will be installed southwest of the main generating facility building. The power from the transformer will be routed along the western property line to switchgear. This switchgear will be located outside the battery limits at the AFGD system electric yard.

Considering that both construction and operating power needs emanate from a power generation station, the availability and reliability are not compromised for continuous service to the AFGD facility.

b. Land

The AFGD process is designed to require a minimum amount of space, and is thereby applicable for difficult retrofit situations. Equipment for the AFGD process requires
E-56 about 75,000 square feet (1.72 acres) of land area; whereas all facilities associated with the AFGD system require approximately four acres excluding on-site gypsum storage. The land area required by each section of the process is as follows:

| | | Land Use | |
|---|---|---|---|
| | Process Section | Required ($FT^2$) | Acres |
| 1. | Limestone feed system | 10,000 | 0.23 |
| 2. | Absorber system | 50,000 | 1.15 |
| 3. | Gypsum dewatering system | 10,000 | 0.23 |
| 4. | Wastewater evaporation system | 5,000 | 0.11 |
| | SUBTOTAL | 75,000 | 1.72 |

| | | | | |
|---|---|---|---|---|
| | Storage | | | |
| 5. | Primary gypsum storage | 40,000 | 0.92 | E-31 |
| | Auxiliary Facilities | | | |
| 6. | Roads, Buildings, etc. | 59,200 | 1.36 | |
| | TOTAL | 174,200 | 4.00 | |

The absorber system and the wastewater evaporation system must be located close to the flue gas path and are, therefore, in a more restricted access area.

The limestone feed system and the gypsum dewatering system are also located close to the absorber to minimize piping lengths. A small gypsum emergency stackout building will be located near the absorber. Northern Indiana's fly ash silos are existing and adequate for storage prior to disposal. E-31

c. Labor

The AFGD process requires approximately the following amount of operations and maintenance personnel:

| Job Description | Shifts/Week |
|---|---|
| Operators | 16 |
| Maintenance | 4 |
| Shift Supervisors | 4 |
| Manager | 2 |
| TOTAL | 26 |

The plant requires four operators per shift working five days per week (8.0 hours/shift).

There will also be four maintenance personnel who will normally work during the day shift (Monday to Friday).

d. Materials

The only raw materials required by the process are limestone and hydrated lime. The quantities of these materials required at full load are as follows:

Limestone - 32.0 T/Hr (96.5 percent $CaCO_3$)
Hydrated Lime - 28.7 Lbs/Hr (95 percent $Ca(OH)_2$)

The limestone is required as the reagent to react with and capture the $SO_2$ in the flue gas. The limestone is added based on a stoichiometric ratio of 1.05 moles $CaCO_3$/1.0 moles $SO_2$ removed, and a limestone composition of 96.5 percent $CaCO_3$ and 3.5 percent inerts by weight. Limestone is found in abundance in the upper midwestern United States.

The hydrated lime is used to neutralize the gypsum wash wastewater before it is sent to either the WES or an on-site wastewater pond. The hydrated lime is added to neutralize the water stream prior to feeding to the WES. Only stable $CaCl_2$ will be formed when the pH is adjusted to a value of 8.0. The hydrated lime will neutralize the acidic components in the wastewater to achieve a neutral or basic wastewater pH.

e. Transportation

The AFGD process requires the transport of the limestone and hydrated lime raw materials into the plant site and the gypsum by-product out of the plant site. The maximum

quantities of these materials which will be transported and the method of transportation are as follows:

| | Raw Materials | Quantity (Tons/Day) | Method/Frequency of Transportation |
|---|---|---|---|
| 1. | Limestone | 760 | 38 trucks every day* |
| 2. | Hydrated Lime | 0.34 | One truck every one to two months |
| | **By-Product** | | |
| 1. | Gypsum | 1,358 | Continuous conveyor belt to nearby gypsum transfer building |

* Based on 20 Tons/Truck

The limestone and hydrated lime will be shipped to the plant in trucks.

Delivery of the gypsum to either the landfill or an off-site wallboard manufacturer will be accomplished with an additional 35 to 40 trucks daily. The impact of this vehicular traffic is discussed in Sections 4.5.2.1 and 4.5.2.2. E-30

2.1.3.5 Potential Environmental, Health, Safety and Socioeconomic (EHSS) Receptors

A number of EHSS aspects could potentially be impacted by the AFGD system construction and operation. These include primarily air quality, surface water quality, various socioeconomic factors, sound levels, and energy and materials resources. Section 3, Existing Environment, of this EIV focuses on characterizing these probable receptors E-32

and other EHSS aspects of the AFGD project. Section 4, Consequences (Impacts) of the Project, evaluates the potential impacts of the AFGD project on these receptors.

## 2.2 ALTERNATIVES TO THE PROPOSED ACTION

This subsection discusses three alternatives to the proposed AFGD project: no action, use of alternative technologies, and alternative sites for the project.

### 2.2.1 The No-Action Alternative

Under the No-Action Alternative the DOE would not provide funds to facilitate the demonstration of the unique features of the AFGD system. Thus, potential implementation of these features could be hindered and not undertaken in a timely manner. This could also impede the development of alternative technologies to control the precursors of acid rain.

The No-Action Alternative would also involve leaving the existing Bailly Station engineering design and configuration unmodified. This would then allow the station to continue operating at its existing emission levels.

### 2.2.2 Alternative Technologies

The proposed action is to install an AFGD system at the Northern Indiana Bailly Generating Station to provide a demonstration of the effectiveness of a number of unique features described in Section 1, Introduction and Subsection 2.1.3, Engineering Description of the Proposed Action. These combined features will result in the reduction of $SO_2$ emissions at the station and demonstrate the potential for operating AFGD systems with reduced solid waste and wastewater disposal problems.

Although the FGD industry has been in existence for approximately 20 years, there are no commercially competitive

processes that produce a consistently saleable by-product other than gypsum-producing systems. Both the Wellman-Lord and the Magnesium Oxide processes have received only minor commercial acceptance. Economic projections continue to show that these processes are not economically competitive with either conventional technology or the proposed AFGD system unless a unique market situation exists for sales of the $H_2SO_4$, elemental sulfur or concentrated $SO_2$ products.

Since the proposed AFGD system has the potential to produce no solid waste, it is environmentally superior to other competitive technologies that produce a waste product. Nearly all FGD systems in operation in the United States at present produce a solid waste. Other competitive technologies such as fluidized bed combustion, sorbent injection, and spray dryer FGD systems also produce a solid waste. On a worldwide basis, only the gypsum-producing FGD systems have consistently proven to be capable of reducing $SO_2$ emissions while generating no solid wastes.

Many FGD systems are permitted for wastewater discharges. Gypsum-producing FGD systems inherently have a wastewater discharge to control the chloride content of the gypsum by-product. The proposed AFGD system will demonstrate a wastewater evaporating system whereby a part of the wastewater stream produced by the process is recirculated back to the flue gas stream ahead of the electrostatic precipitator and evaporated. Thus, in a commercial application this system has the potential for lower or no wastewater discharge under any conditions of boiler load or coal sulfur content.

The stoichiometric ratio for the system is 1.0 moles of calcium carbonate per mole of $SO_2$ in the flue gas, or alternatively 1.05 moles of calcium carbonate per mole of $SO_2$ removed for a 95 percent $SO_2$ removal efficiency. For

comparative purposes, circulating fluidized bed boilers typically operate with a calcium/sulfur ratio of 2 for approximately 80 percent removal and a calcium/sulfur ratio of 3 to 4 for a 90 percent removal. Sorbent injection systems, including furnace sorbent injection, economizer sorbent injection, and duct sorbent injection typically operate with a calcium/sulfur ratio of 2 for a 40 to 60 percent removal level. Spray dryer FGD systems, which are commercially available, typically operate at a calcium/sulfur ratio of 1.3 to 1.4 for 90 percent removal on a high sulfur coal. Thus, while fluid bed and sorbent injection are often viewed as attractive technologies, the amount of limestone consumed is significantly higher than the proposed AFGD system and a non-saleable waste product is produced. Even spray dryer FGD systems require 30 to 40 percent more limestone for an equivalent $SO_2$ removal. From the standpoint of the consumption of a non-renewable resource (limestone), the AFGD system is superior to either conventional technology or other emerging competitive technologies.

### 2.2.3 Alternative Sites

The Bailly Station was selected 1) because of the ability of the proposed AFGD facility to meet envisaged emission requirements, when acid rain legislation passes, and 2) to demonstrate uniqueness in the AFGD system to scrub efficiently one flue gas stream from multiple boilers.

Northern Indiana owns and operates three other generating stations. Each of these stations could potentially have served as a site for the AFGD demonstration. However, none of these was chosen because of the current operation of the Northern Indiana generating system.

# 3.0 EXISTING ENVIRONMENT

## 3.1 ATMOSPHERIC RESOURCES

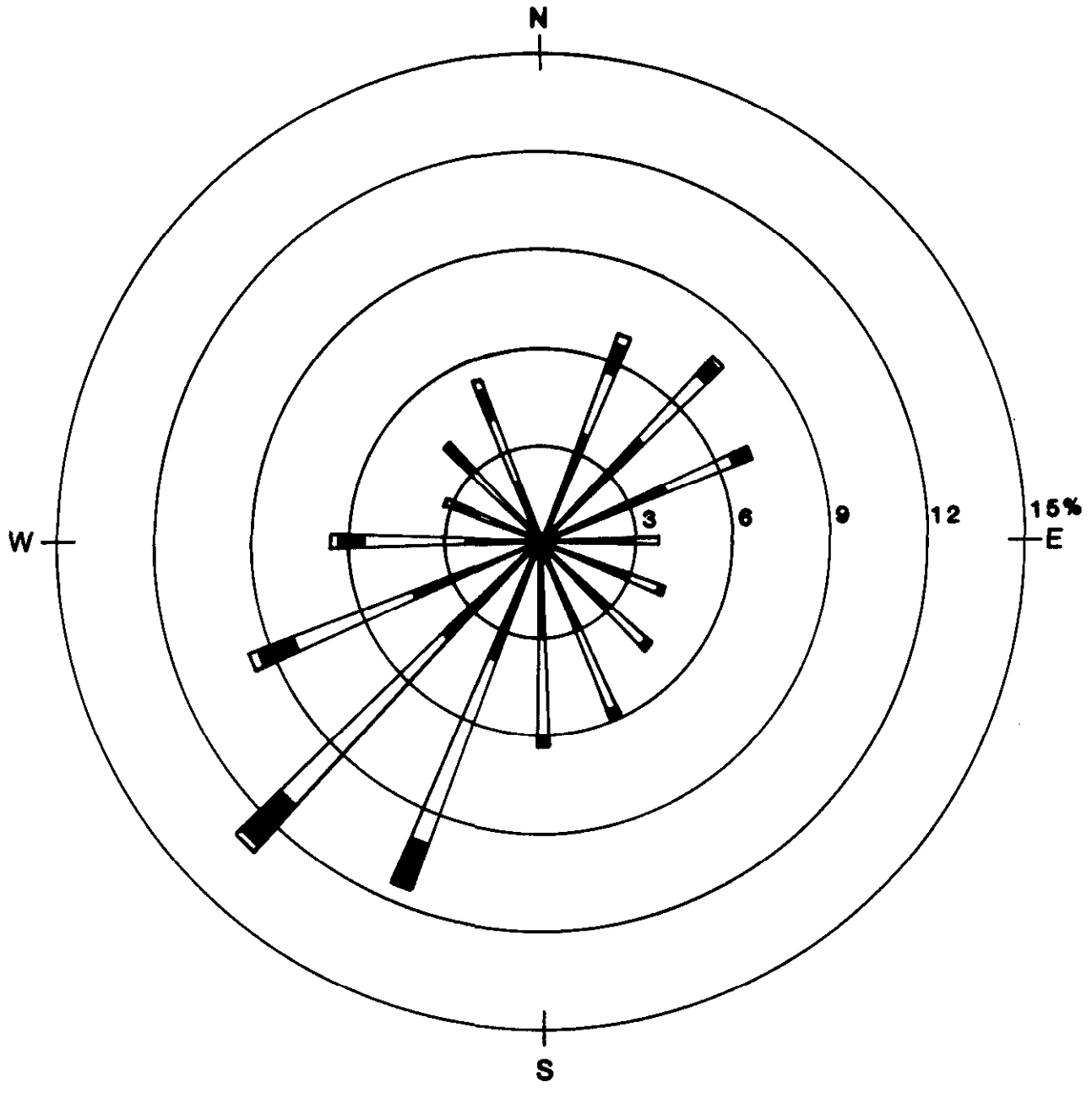
### 3.1.1 Site Meteorology

The climate of the site is continental, characterized by high winds and frequent weather changes. The area is subject to cold, dry winters and warm, moist summers. These climatic characteristics are the result of storms moving eastward along the northern tier of the United States and storms in the southwest moving toward the Great Lakes. The average temperature for the area is approximately $50^{o}F$, with the highest temperatures occurring between May and August, while the lowest temperatures occur in the fall and winter.

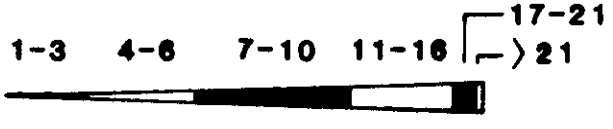
The area is known for frequent high winds; however, damaging winds are rare. During a 10-year period, 20 tornadoes were identified and reported in the $1^{o}$ latitude and $1^{o}$ longitude sector containing the plant site. Using the Thom technique, the cycle for a tornado striking a point in this sector is 635 years.

There are important climatological differences between dune areas, which include the plant site, and more urban inland areas. The modifying effect of Lake Michigan is such that the dune areas receive less precipitation than areas further inland. Ogden Dunes receives only 36.6 inches of precipitation per year, while LaPorte, about 23 miles to the southeast, averages 47.7 inches of precipitation per year.

Wind velocity data are summarized in Figure 3.1-1. These data were compiled by Northern Indiana and submitted to




Source: Indiana Department of Environmental Management




WIND SPEED CLASSES
(KNOTS)

Note:
Wind direction is the direction from which the wind is blowing.

Pure Air
a joint venture company
ADVANCED FLUE GAS DESULFURIZATION

Windrose '84 - '86
Dune Acres Data

Figure 3.1-1

the Indiana Department of Environmental Management (IDEM) in accordance with state regulation. The data were used in the Porter County State Implementation Plan (SIP) development study. The data are collected at the Dune Acres substation located one mile southeast of the Bailly Station. E-33

### 3.1.2 Air Quality

Air quality is a source of concern in the highly-industralized area adjacent to the Bailly Station. Recently, IDEM conducted a study to develop a control strategy to attain the National Ambient Air Quality Standards (NAAQS) for $SO_2$. The result of this study indicated that the NAAQS for $SO_2$ are being met; however, the concentrations predicted were very close to the standards. E-33

The area is currently designated as "attainment" for most criteria pollutants except ozone ($O_3$) and CO, neither of which will be impacted by construction and operation of the AFGD system. E-33 E-57

The Bailly Station is located adjacent to Bethlehem Steel's Burns Harbor Plant and Midwest Steel. Steel mills emit a large amount of $SO_2$ to the air. Bethlehem Steel and Midwest Steel, combined, emit close to 100,000 tons of $SO_2$ per year. The Bailly Station emits approximately 70,000 tons of $SO_2$ per year. The proximity of other industry also contributes to the concentrations of $SO_2$ in the air.

Northern Indiana has collected air-quality data at the Bailly Station for over ten years. The Bailly Ambient Air Monitoring Network has been modified as of January 1, 1989 and has now been incorporated into the Porter County $SO_2$ Monitoring Network. Northern Indiana now operates three $SO_2$ monitoring sites within the Porter County $SO_2$ monitoring network. Meteorological data are collected at two of the

three $SO_2$ monitoring sites. The Northern Indiana $SO_2$ monitoring sites include:

| | |
|---|---|
| 1) Main Office Site | $SO_2$ data collection |
| 2) Lagoon Site | $SO_2$ and meteorological data collection |
| 3) Dune Acres Site | $SO_2$ and meteorological data collection |

Northern Indiana does not currently monitor any other criteria pollutants ($NO_2$, CO, $O_3$, PM10) from these
E-34 sites. Other monitoring stations are operated by the State of Indiana (IDEM), National Park Service and Porter County.

Northern Indiana continuously monitors the plume opacity from the Bailly Station stack. Periodic stack tests are also conducted to determine emission rates for $SO_2$ and particulates. The existing air permit allows for an emission level of 6.0 lbs/MMBtu for $SO_2$, 0.22 lbs/MMBtu for particulate matter and an opacity limit not to exceed 40 percent.

## 3.2 LAND RESOURCES

### 3.2.1 Geology

The Bailly Station is located in a stable geological region in which no faults have been identified in either the basement or in the overlying sedimentary rock. It is adjacent to Lake Michigan in an area where the sand dunes have been leveled and stripped of vegetation. Natural dune sands extend from the existing ground surface to depths ranging between 10 and 30 feet.

The stratigraphy of the region near the Bailly Station is shown in Figure 3.2-1. The surficial geology of the Bailly Station is illustrated in Figure 3.2-2. The sequence consists of lake plain sediments over glacial deposits over dolomitic bedrock of Silurian age. The sands were deposited as a consequence of postglacial lake activity. The major component of the glacial deposits is a glacial till deposited by the slow melting of glacial ice. Glacial till is an unsorted, unbedded mixture of silt, clay, sand, gravel and boulders. Bedrock is located 185 feet below the ground surface. The bedrock consists of shales and dolomitic limestone. E-69 E-69

The most pronounced topographic feature in Porter County is the Valparaiso Moraine. It is a terminal mass of rocks, sand and gravel. The Valparaiso Moraine was formed by glaciation of the Wisconsin Age. It serves as the dividing line for drainage into Lake Michigan.

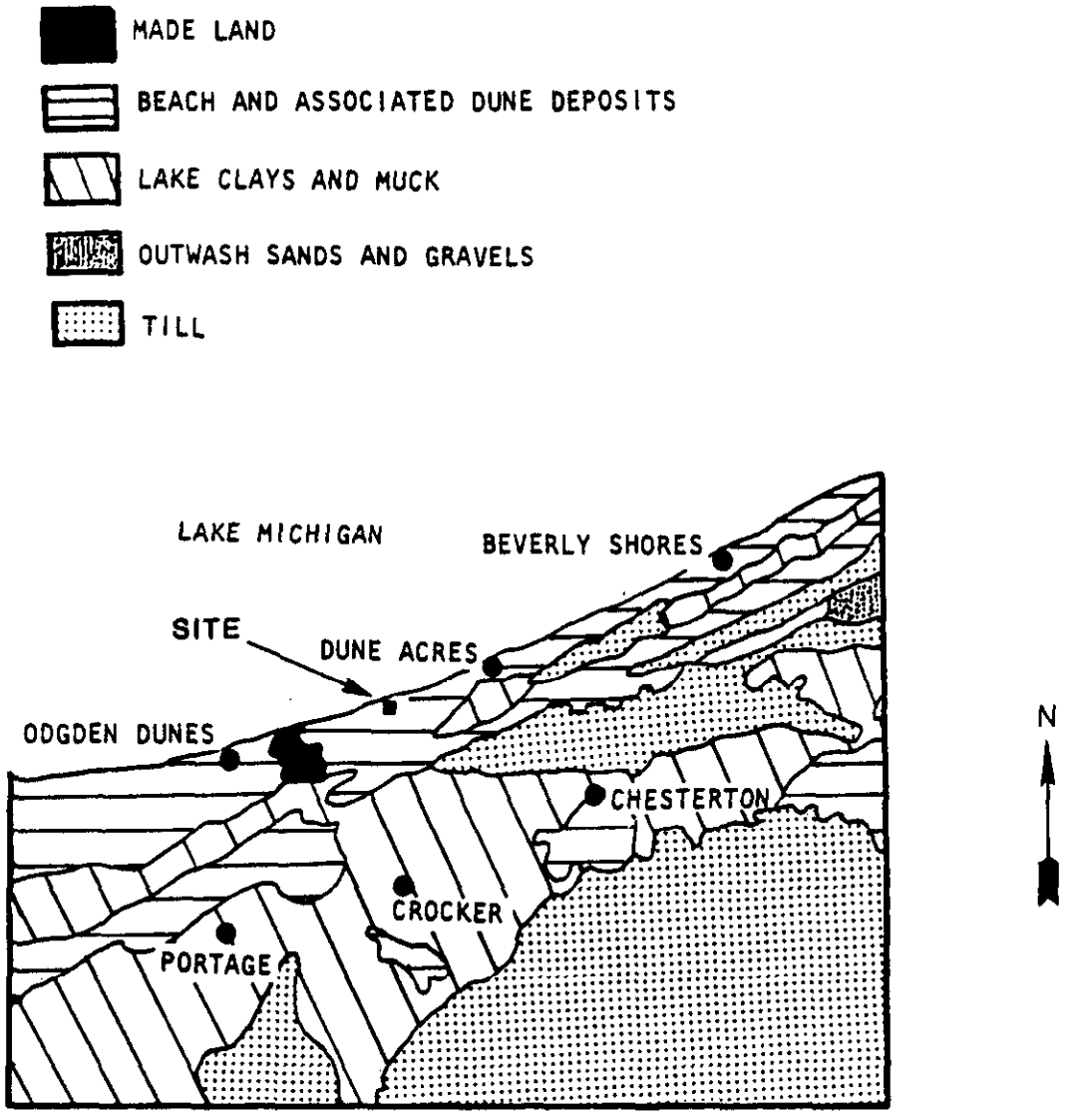
| System | Depth (feet) | Formation | Hydrological Unit | LOG | Lithology |
|---|---|---|---|---|---|
| QUATERNARY | 20 | | | | Dune sand (eolian), loose to moderately dense |
| | 10 | | Glacial Drift | | Glacio-lacustrine-beach deposit fine sands, moderately dense |
| | 5 | | Aquifer | | Glacio-lacustrine, silty clay |
| | 18 | | | | Glacio-lacustrine deposit silt and silty clay |
| | 80 | | | | Glacio-lacustrine consolidated lake clays Dense Beach Deposits |
| | 30 | | | | Glacio-lacustrine, stiff to hard silty clays with layers of silt and sand |
| | 27 | | | | Glacial Till, hard sandy and clayey silt Shale (Antrim) |
| MISSISSIPPIAN-PENNSYLVANIAN | | | | | Cyclothems: Shale<br>Sandstones<br>Limestones<br>Coal<br>Clay |
| DEVONIAN | 100 | | | | Shale lenses 50'<br>Gypsiferous<br>Limestones<br>Sandy Dolomites |
| SILURIAN | 500 | Salina<br>Wabash<br>Louisville<br>Salomonie<br>*Brassfield* | Silurian | | Limestones and dolomites |
| ORDOVICIAN | 700 to >1100 | | Maquoketa | | Shale, dolomite |
| | | | Galena-Platteville | | Dolomites |
| | | St. Peter | Glenwood-St. Peter | | Sandstone |
| | | *Prairie du Chien* | *Prairie du Chien* | | Dolomites and Sandstones |
| CAMBRIAN | 2000 to 3500 | Trempealeau | Trempealeau | | Dolomites |
| | | Franconia | Franconia | | Dolomites, Sandstones, Shales |
| | | Ironton<br>Galesville | Ironton - Galesville | | Sandstone and Limestones |
| | | Eau Claire<br>Mt. Simon | Eau Claire | | Shale, Siltstone, Dolomite, Sandstones, Shale |
| Precambrian | | | | | |

Source: Northern Indiana Public Service Company, "Final Environmental Statement Related to Construction of Bailly Generating Station Nuclear-1," February 1973

Pure Air
a joint venture company
ADVANCED FLUE GAS DESULFURIZATION

Site Stratigraphy of Porter County, Indiana

Figure 3.2-1




Source: Texas Instruments, Inc., "1974-1975 Annual Report - Bailly Nuclear I Site"

Pure Air
a joint venture company
ADVANCED FLUE GAS DESULFURIZATION

Surficial Geology in Vicinity of Bailly Generating Station

*Figure 3.2-2*

### 3.2.2 Seismology

The Bailly Station is located in an area of minor seismic activity where, since the beginning of the 19th century, only seven shocks have been reported for epicenters within 100 miles of the station. Of these seven, only three have occurred within 50 miles of the site. The largest occurred in 1938 near the south shore of Lake Michigan and had a Modified Mercalli Scale (Table 3.2-1) of IV. This shock was felt indoors by many, but outdoors by few.

### 3.2.3 Soils

Soils located in the vicinity of the station are composed primarily of five types: Oakville fine sand, Houghton muck, Adrian muck, Maumee loamy fine sand, and Dune land. The large portion of ground used for industrial purposes in the area is classified as cut and fill. This is illustrated in Figure 3.2-3, "Soil Composition - Bailly Generating Station Area."

Oakville fine sands are located on the older dunes in the area and are vegetated by immature and mature black oak forests. Productivity is limited primarily because of low available water capacity and frequent drought.

Soils in the northern portion of the subdunal area are comprised of Houghton muck. These soils are very poorly drained with a thick muck surface layer. The very poorly drained organic material of the soils severely limits the productivity of plants other than wetland species.

The soils of the subdunal area and interdunal ponds are composed primarily of Adrian muck. These soils are very poorly drained and have characteristics similar to Houghton muck.

TABLE 3.2-1: MODIFIED MERCALLI SCALE

I. Not felt except by a few under especially favorable circumstances.

II. Felt only by a few persons at rest, especially on upper floors of buldings. Delicately suspended objects may swing.

III. Felt quite noticeably indoors, especially on upper floors of buildings, but many people do not recognize it as an earthquake. Standing automobiles may rock slightly. Vibration like passing of truck. Duration estimated.

IV. During the day felt indoors by many, outdoors by few. At night some awakened. Dishes, windows, doors distubed, walls make creaking sound. Sensation like heavy truck striking building. Automobiles rocked noticeably.

V. Felt by nearly everyone, many awakened. Some dishes, windows, etc., broken; a few instances of cracked plaster; unstable objects overturned. Disturbance of trees, poles, and other tall objects sometimes noticed. Pendulum clocks may stop.

VI. Felt by all; many frightened and run outdoors. Some heavy furniture moved; a few instances of fallen plaster or damaged chimneys. Damage slight.

VII. Everybody runs outdoors. Damage negligible in buildings of good design and construction; slight to moderate in well-built ordinary structures; considerable in poorly built or badly designed structures; some chimneys broken. Noticed by persons driving automobiles.

VIII. Damage slight in specially designed structures; considerable in ordinary substantial buildings, with partial collapse; great in poorly built structures. Panel walls thrown out of frame structures. Fall of chimneys, factory stacks, columns, monuments, walls. Heavy furniture overturned. Sand and mud ejected in small amounts. Changes in well water. Disturbs persons driving autos.

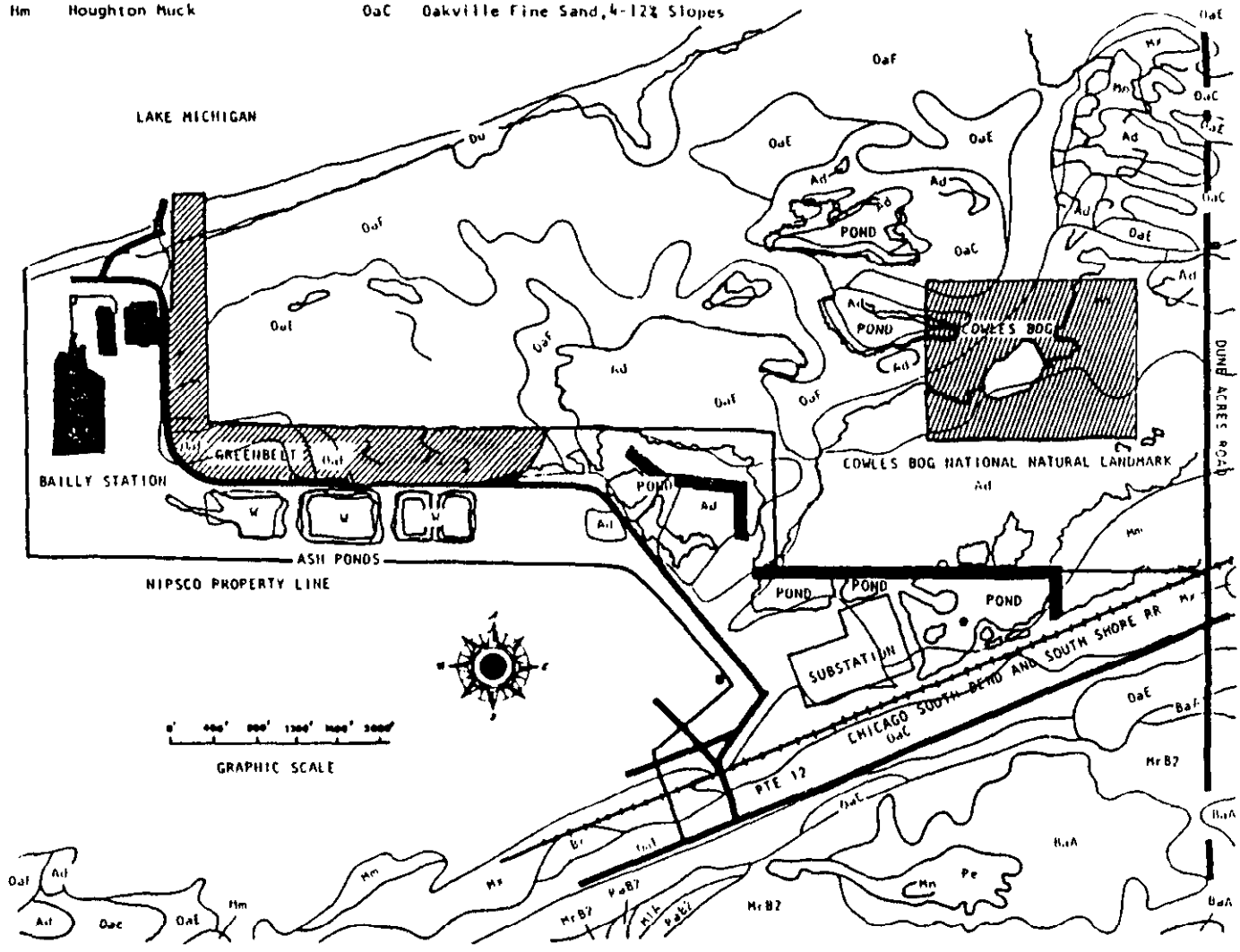
IX. Damage considerable in specially designed structures; well-designed frame structures thrown out of plumb; great in substantial buildings, with partial collapse. Buildings shifted off foundations. Ground cracked conspicuously. Underground pipes broken.

X. Some well-built wooden structures destroyed; many masonry and frame structures destroyed with foundations; ground badly cracked. Rails bent. Landslides considerable from river banks and steep slopes. Shifted sand and mud. Water splashed (slopped) over banks.

XI. Few, if any, (masonry) structures remain standing. Bridges destroyed. Broad fissures in ground. Underground pipe lines completely out of service. Earth slumps and land slips in soft ground. Rails bent greatly.

XII. Damage total. Waves seen on ground surfaces. Lines of sight and level distorted. Objects thrown upward into the air.

| | | | | | |
|---|---|---|---|---|---|
| Ad | Adrian Muck | MtA | Martinsville Loam, 0-2% Slopes | OaE | Oakville Fine Sand, 12-25% Slopes |
| BaA | Blount Silt Loam, 0-3% Slopes | Mn | Maumee Loamy Fine Sand | OaF | Oakville Fine Sand, 25-65% Slopes |
| Br | Brady Sandy Loam | Mn | Maumee Loamy Fine Sand, Undrained | Pe | Pewamo Silty Clay Loam |
| Ct | Cut and Fill | MrB2 | Morley Silt Loam, 2-6% Slopes, Eroded | RaB2 | Rawson Loam, 2-6% Slopes, Eroded |
| Du | Dune Land | Mx | Morocco Loamy Fine Sand | W | Water |
| Hm | Houghton Muck | OaC | Oakville Fine Sand, 4-12% Slopes | | |




Source: Texas Instruments, Inc., "1974-1975 Annual Report - Bailly Nuclear I Site"

Pure Air
a joint venture company
ADVANCED FLUE GAS DESULFURIZATION

**Soil Composition - Bailly Generating Station Area**

Figure 3.2-3

Soils at the southern end of the subdunal area are composed of Maumee loamy fine sand. Maumee soils are very poorly drained, coarse-textured soils that occupy nearby level flats and depressions. These soils are less wet and have shorter periods of standing waters than the subdunal area.

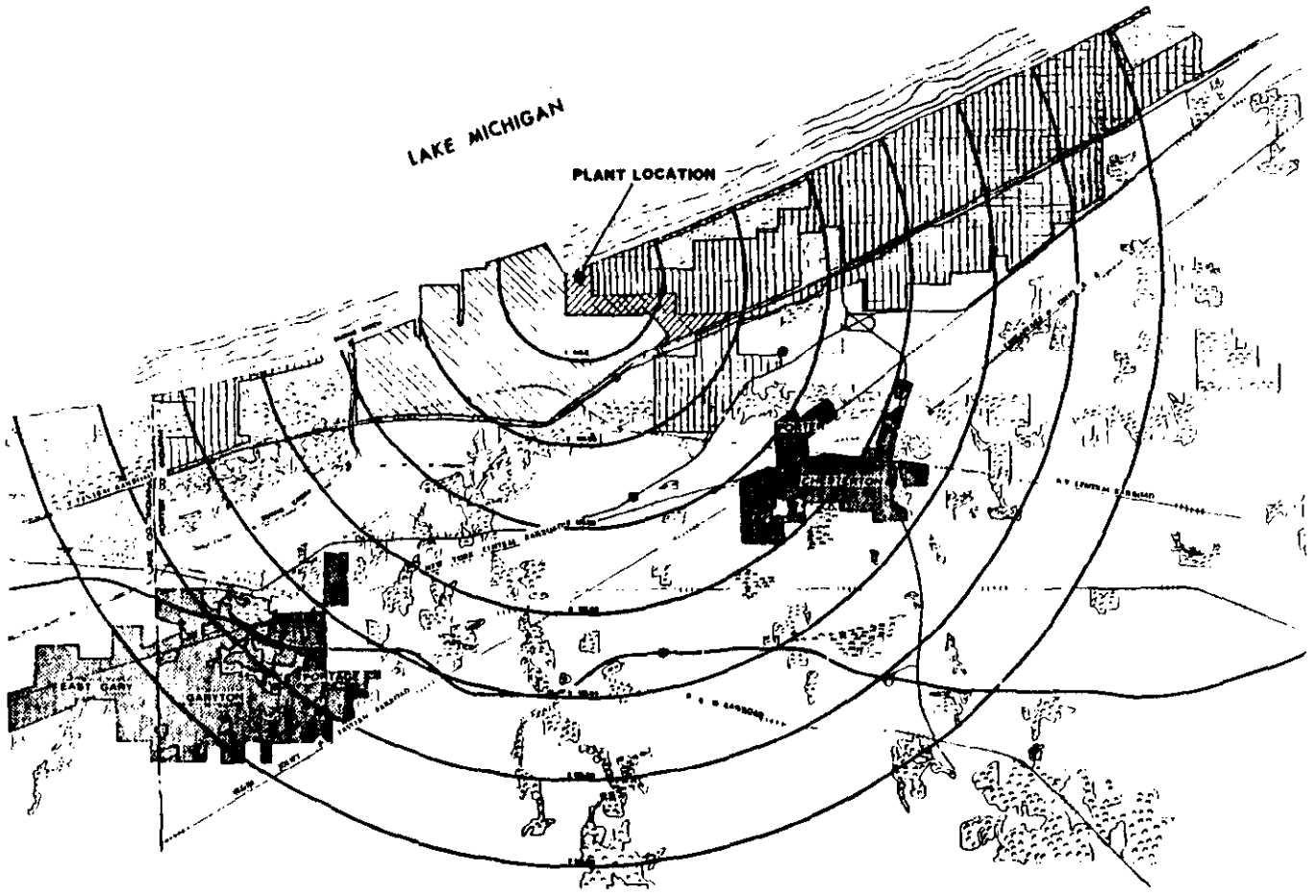
Dune land occupies the area extending inland from the shore of Lake Michigan to established sand dunes. The blowing and deposition of sand create conditions that are tolerated by only a few plant species.

### 3.2.4 Land Use

Figure 3.2-4 graphically depicts the area surrounding the Bailly Generating Station. The station is bordered on the south and west by the Bethlehem Steel Corporation's Burns Harbor Complex. The Indiana Dunes National Lakeshore Park borders the site to the east and the south.

The area to the west of the site is heavily industralized. Lake County, five miles west of the site, includes Gary, Hammond and East Chicago, all of which are centers of heavy industry. Steel manufacturing is the major industry.

Very little of the land north of Highway 12 is either suitable or used for agriculture. However, the area south of the Indiana Toll Road is largely devoted to growing corn and soybeans. Approximately 60 percent of the land in Porter County is used for agricultural purposes. The closest houses to the Bailly Station are those within the town of Dune Acres, two miles northeast of the station. No unincorporated areas of Porter County, within which persons could be living, are closer than Dune Acres.




N

LEGEND

- RESIDENTIAL
- AGRICULTURAL & OTHER LAND
- MARSH
- FOREST COVER
- INDUSTRIAL
- RECREATIONAL (State & Federal Parks)
- BAILLY GENERATING STATION
- WATER
- RAILROAD
- HIGHWAY
- SUPER HIGHWAY
- NIKE MISSLE SITE

Source: Northern Indiana Public Service Company, "Bailly Generating Station Nuclear 1, *Environmental Report*," 1971

Note: Concentric Rings are Spaced at 1-Mile Intervals

Pure Air
a joint venture company
ADVANCED FLUE GAS DESULFURIZATION

Land - Use Map

Figure 3.2-4

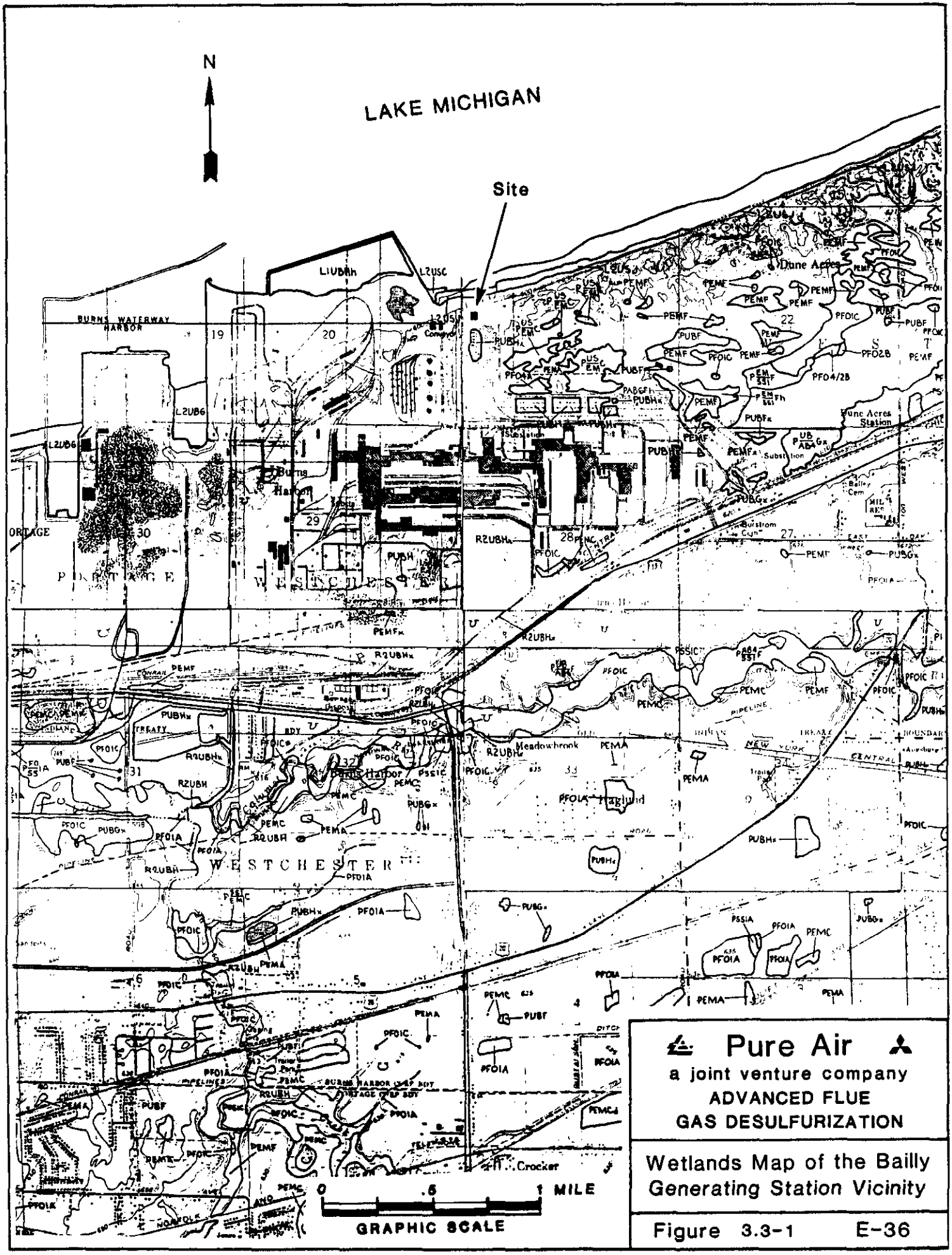
## 3.3 WATER RESOURCES

### 3.3.1 Ground Water

Ground water at the station area occurs at depths from 44 to 270 feet and flows northward to the lake at a rate of approximately 0.5 feet per day, in two formations. The top formation is comprised of dune materials and is up to 125 feet thick. The lower formation is silt and clayey sand and is up to 150 feet thick. Aquifers for ground water are present in the bedrock, located at a depth of 185 feet. Most of the wells within 10 miles of the Bailly Station were drilled for test purposes by the Indiana Toll Road Commission and State Highway Department. Other wells are used primarily for domestic and public water supply sources. There is only one well within a mile of the station, and a total of three wells at a distance of two miles. The nearest municipal water system is that of Dune Acres. In Dune Acres, three wells have been drilled to a depth of about 30 feet, approximately 300 feet from the shoreline of Lake Michigan. Dune Acres water contains iron (1 to 6.6 ppm), tannin (2 ppm), and is relatively hard (10 grains/gal). For household purposes, without treatment, ground water in the vicinity of the Bailly Station is of marginal quality. Tannin is found in ground water throughout the Bailly Station area. This indicates that a portion of the ground water originates from the percolation of rain and surface water through the sandy soils of the dune forests and through the bogs and peaty areas in the region.

### 3.3.2 Surface Water

Springs, streams, rivers and bogs are extensive in the general area of the station as shown in Figure 3.3-1 and described in Tables 3.3-1 and 3.3-2. There are, however, no wetlands on the Bailly Station property. The major watershed E-35




**Pure Air**
a joint venture company
ADVANCED FLUE GAS DESULFURIZATION

Wetlands Map of the Bailly Generating Station Vicinity

Figure 3.3-1 E-36

TABLE 3.3-1: FRESHWATER WETLAND CLASSIFICATION INDICATED IN FIGURE 3.3-1

System: Palustrine (P) - No Subsystem

Class: Rock Bottom (RB)
Subclass:
1. Bedrock
2. Rubble

Class: Unconsolidated Bottom (UB)
Subclass:
1. Cobble/Gravel
2. Sand
3. Mud
4. Organic

Class: Aquatic Bed (AB)
Subclass:
1. Algae
2. Aquatic Moss
3. Rooted Vascular
4. Floating Vascular
5. Unknown Submergent
6. Unknown Surface

Class: Unconsolidated Shore (US)
Subclass:
1. Cobble/Gravel
2. Sand
3. Mud
4. Organic
5. Vegetated

Class: Moss Lichen (ML)
Subclass:
1. Moss
2. Lichen

Class: Emergent (EM)
Subclass:
1. Persistent
2. Nonpersistent

Class: Scrub Shrub (SS)
Subclass:
1. Broad Leaf Deciduous
2. Needle Leaf Deciduous
3. Broad Leaf Evergreen
4. Needle Lead Evergreen
5. Dead

TABLE 3.3-1: (Continued)

Class: Forested (FO)
Subclass: 1. Broad Leaf Deciduous
2. Needle Leaf Deciduous
3. Broad Leaf Evergreen
4. Needle Lead Evergreen
5. Dead

Class: Open Water
Subclass: Unknown Bottom

MODIFYING TERMS (in order to describe more adequately wetland and aquatic habitats, water regime, water chemistry, soil or special modifiers may be applied)

Water Regime (Non-tidal)

A. Temporary
B. Saturated
C. Seasonal
D. Seasonal Well-Drained
E. Seasonal Saturated
F. Semipermanent
G. Intermittently Exposed
H. Permanent
J. Intermittently Flooded
K. Artificial
Z. Intermittently Exposed/ Permanent
W. Intermittently Flooded/ Temporary
Y. Saturated/Seasonal/ Semipermanent
U. Unknown

Water Chemistry

Inland Salinity
7. Hypersaline
8. Eusaline
9. Mixosaline
0. Fresh

pH Modifiers for Freshwater
a. Acid
t Circumneutral
1. Alkaline

Soil

g. Organic
n. Mineral

Special Modifiers

b. Beaver
d. Partially drained/ditched
f. Farmed
h. Diked/impounded
r. Artificial
s. Spoil
x. Excavated

Source: Indiana Department of Natural Resources, Fish and Wildlife Division

TABLE 3.3-2: WETLANDS AND DEEPWATER HABITATS CLASSIFICATION INDICATED IN FIGURE 3.3-1

System: Lacustrine (L)

Subsystem: Limnetic (1)

Class: Rock Bottom (RB)
Subclass:
1. Bedrock
2. Rubble

Class: Unconsolidated Bottom (UB)
Subclass:
1. Cobble/Gravel
2. Sand
3. Mud
4. Organic

Class: Aquatic Bed (AB)
Subclass:
1. Algae
2. Aquatic Moss
3. Rooted Vascular
4. Floating Vascular
5. Unknown Submergent
6. Unknown Surface

Subsystem: Littoral (2)

Class: Rock Bottom (RB)
Subclass:
1. Bedrock
2. Rubble

Class: Unconsolidated Bottom (UB)
Subclass:
1. Cobble/Gravel
2. Sand
3. Mud
4. Organic

Class: Aquatic Bed (AB)
Subclass:
1. Algae
2. Aquatic Moss
3. Rooted Vascular
4. Floating Vascular
5. Unknown Submergent
6. Unknown Surface

TABLE 3.3-2: (Continued)

Class: Rocky Shore (RS)
Subclass: 1. Bedrock
2. Rubble

Class: Unconsolidated Shore (US)
Subclass: 1. Cobble/Gravel
2. Sand
3. Mud
4. Organic
5. Vegetated

Class: Emergent (EM)(1)
Subclass: 2. Nonpersistent

Class: Open Water
Subclass: Unknown Bottom

System: Riverine (R)

Subsystem: Lower Perennial (2)
Upper Perennial (3)
Intermittent (4)
Unknown Perennial (5)

Class: Emergent (EM)(1)
Subclass: Nonpersistent

Class: Rock Bottom (RB)
Subclass: 1. Bedrock
2. Rubble

Class: Unconsolidated Bottom (UB)
Subclass: 1. Cobble/Gravel
2. Sand
3. Mud
4. Organic

TABLE 3.3-2: (Continued)

Class: Aquatic Bed (AB)
Subclass:
1. Algae
2. Aquatic Moss
3. Rooted Vascular
4. Floating Vascular
5. Unknown Submergent
6. Unknown Surface

Class: Stream Bed (SB)
Subclass:
1. Bedrock
2. Rubble
3. Cobble/Gravel
4. Sand
5. Mud
6. Organic
7. Vegetated

Class: Rocky Shore (RS)
Subclass:
1. Bedrock
2. Rubble

Class: Unconsolidated Shore (US)
Subclass:
1. Cobble/Gravel
2. Sand
3. Mud
4. Organic
5. Vegetated

Class: Open Water
Subclass: Unknown Bottom

Note to Table 3.3-2:

(1) Emergent class (nonpersistent subclass) is found only in the Lacustrine littoral and the Riverine lower perennial subsystems.

Source: Indiana Department of Natural Resources, Fish and Wildlife Division

system is formed by two primary basins -- the Little Calumet River and Kankakee River systems. The Little Calumet is the critical system with respect to the Indiana Dunes National Lakeshore properties that abut the east side of the station site. Some marshy areas to the east and south of the Bailly Station empty into Lake Michigan via Dunes Creek in Indiana Dunes State Park. However, much of the National Lakeshore is within a subwatershed which drains directly toward Lake Michigan through porous soils. The Little Calumet River drains from the Valparaiso Moraine headwaters in LaPorte County to the lake and the Chicago Sag Canal. This gradient is slight owing to the development of extensive subsurface clays which impede drainage. Burns Ditch to the west of the station is but one of an extensive system of ditches that
E-36 were fashioned to facilitate drainage. These surface-water systems are shown in Figure 3.3-1.

Burns Ditch is a highly polluted canal about 200 feet wide and eight miles long which empties into Lake Michigan. The lower end of Burns Ditch is used as a docking and marina area. Salmon introduced into the lake use Burns Ditch for access to their spawning grounds in the Little Calumet River.

Lake Michigan, to the north of the station, is the third largest of the Great Lakes in area (22,300 square miles) and second in volume (173 trillion cubic feet). Water levels are highest in summer and lowest in late winter and early spring. The lake is divided into two basins by two parallel ridges running in an easterly direction from Milwaukee to Grand Haven. The Bailly Station is located on the shore of the southern basin.

Inshore waters are used for drinking water, recreation (fishing, swimming) and industry. This area

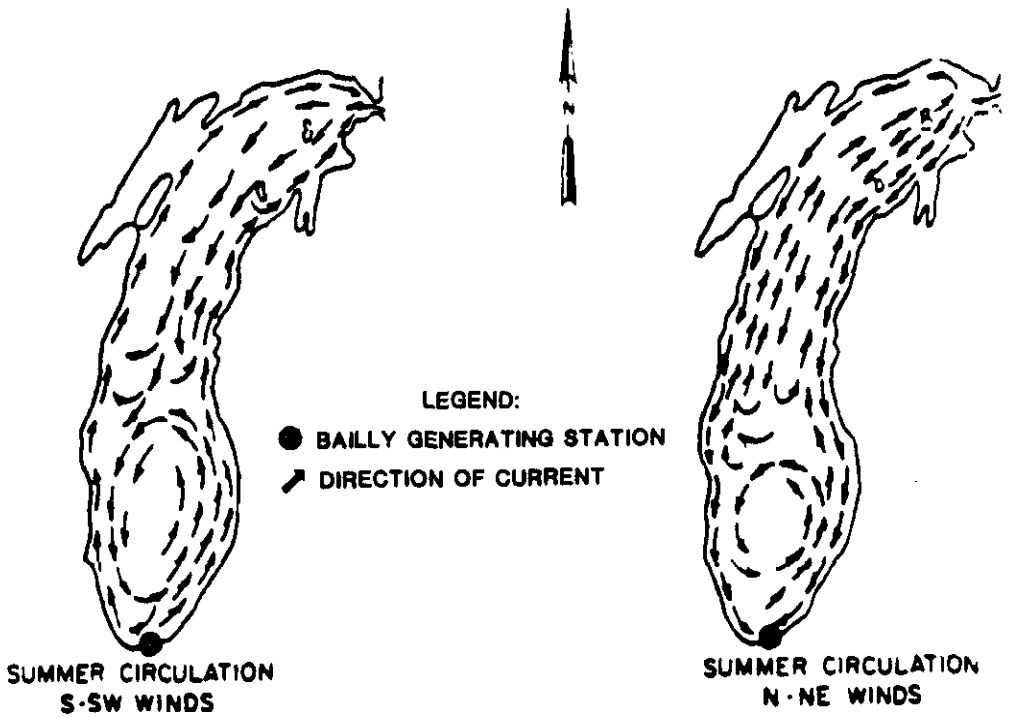
represents 21 percent of the total area of Lake Michigan, including Green Bay.

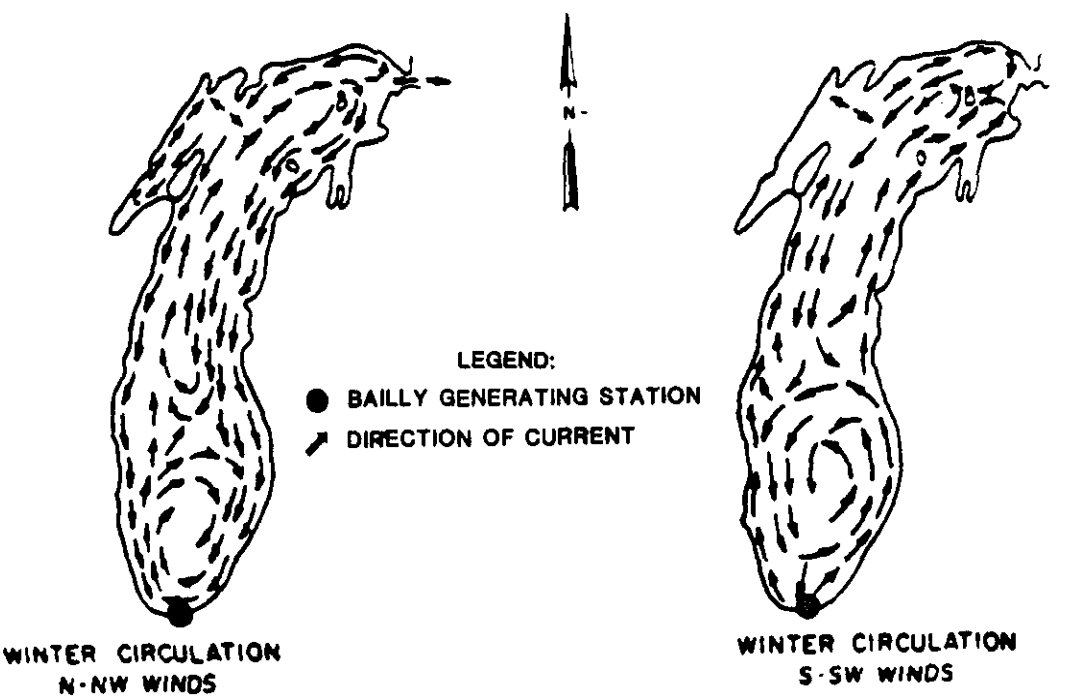
The beach water zone is the portion of water that extends from shore to a depth of 30 feet. It is a subarea of the inshore zone that, in Lake Michigan, comprises seven percent of the lake surface, including Green Bay. In this zone are the water intake and discharge structures for the existing Bailly Station coal-fired units.

Over a five-year study (March '74 to December '78), the lake temperatures ranged from 37.4° to 73.4°F. Ice may cover this section of Lake Michigan from January to March. Ice melting and warming of lake waters generally occurs the latter part of March. During this period the so-called "thermal bar" is likely to develop. It is roughly parallel to the shore and is near the temperature of fresh water at its maximum density (39°F). The "thermal bar" limits the exchange of inshore-offshore waters.

Lake Michigan has two circulation periods per year, with overturns ocurring early winter and early spring in the southern basin. During each approximately month-long period, vertical mixing is almost complete and the lake approaches an isothermal temperature gradient. These periods of overturn facilitate the upwelling of nutrients from the bottom waters and may also stimulate phytoplankton growth. Water movements are also influenced by winds. Prevailing winds blowing in one direction for several days will induce inshore water movement generally parallel to the shore, but bottom topography will alter the direction of the current somewhat. The seasonal current directions are shown in Figure 3.3-2.

Shoreline "run-up" dissipates waves rapidly. Maximum current velocities in the upper layer measured at the




Source: Northern Indiana Public Service Company. "Bailly Generating Station Nuclear 1, Final Environmental Statement Related to Construction," 1973

Pure Air
a joint venture company
ADVANCED FLUE GAS DESULFURIZATION

Seasonal Currents of Lake Michigan

Figure 3.3-2

station were 40 cm/s. Seiches occur occasionally at the southern end of the lake. E-37

An examination of the Federal Emergency Management Agency Flood Insurance Rate Maps and Flood Insurance Studies for Porter County, Town of Dune Acres and Town of Burns Harbor, indicates that the Bailly Generating Station and associated AFGD system are above the 100-year flood elevation of Lake Michigan. This elevation is approximately 584 feet, whereas the project is at an elevation of approximately 620 feet based on the U.S. Geological Survey 7.5 minute quadrangle map for Dune Acres, Indiana; thus, the AFGD system will be constructed 36 feet above the 100-year flood elevation. E-58

"The frequency-elevation data for Lake Michigan was (sic) developed in a Great Lakes Flood Level Study prepared by the Detroit District Corps of Engineers. The study uses the many gages on the Great Lakes which have record lengths of 11 to 75 years. The 100-year lake elevation was studied using the one percent value from the frequency curve of the maximum instantaneous lake level that occurred each year. The 10-, 50-, and 500-year lake elevations were studied with their respective percentage values from the frequency curves. The 10-, 50-, 100-, and 500-year flood elevation for the Lake Michigan area near the unincorporated areas of Porter County are shown in" Table 3.3-3. (Source: Reference 4.) E-58

E-58 TABLE 3.3-3: SUMMARY OF FLOOD ELEVATIONS FOR LAKE MICHIGAN NEAR UNINCORPORATED AREAS OF PORTER COUNTY TO INCLUDE THE BAILLY GENERATING STATION

Elevations (National Geodetic Vertical Datum - 1929)

| 10-Year | 50-Year | 100-Year | 500-Year |
|---|---|---|---|
| 583.0 | 583.9 | 584.2 | 584.8 |

Source: Federal Emergency Management Agency. Flood Insurance Study, County of Porter, Indiana Unincorporated Areas. 1981.

## 3.4 ECOLOGICAL RESOURCES

The area occupied by and surrounding the Bailly Station has a diverse community of terrestrial and aquatic life. The dune region along Lake Michigan in Porter County is estimated to contain at least 40 to 50 percent of the plant species native to Indiana. Various vegetation types as well as commercial, residential and industrial areas are located within the lake region of the Bailly Station. Each area has its own distinguishing characteristics. The terrestrial environments provide a beach succession series - dunes, swales, bogs and oak forests. Freshwater habitats include drainage streams, ponds, bogs, springs and Lake Michigan. Appendix A contains information on the endangered, threatened or rare plants and animals found within the Indiana Dunes National Lakeshore as identified by the State of Indiana, and the federally threatened and endangered species in the Lakeshore. None of the plants, amphibians, reptiles, birds or mammals listed in Appendix A reside on the site of the proposed AFGD system or on the Bailly Station. The current habitats or migratory patterns of wildlife will not be disturbed in any way by the proposed construction of the AFGD system. E-38 E-39

### 3.4.1 Terrestrial

The major terrestrial environments near the Bailly Station are the dunes and wind-cleared blow-outs of the Ogden Dunes to the west and the Indiana Dunes National Lakeshore to the east, and their ponds, old field (former farmland) and associated forest components further inland. Each of these areas has its particular floral composition and faunal components, although larger animals can be expected to move freely from place to place. The Cowles and Pinhook Bogs, within the National Lakeshore Boundaries, are two important and intensively- studied bogs; they are typical of other bogs

and wetlands within the vicinity of the site. Outside the National Lakeshore boundaries, there are a number of drainage ditches. Burns Ditch is of major importance because it may be a source of locally significant nutrient enrichment of Lake Michigan inshore waters.

The forebeach along Lake Michigan is a riprap zone and is visited principally by insects, blown onto the sands, that feed on carrion (fish and birds) cast up on the shoreline. These insects in turn are preyed upon by shore birds and other insects. Plant life per se is essentially
E-39 nonexistent. Literature information indicates that most land vertebrates are merely transients, and a large variety of birds use the shore on their migrations.

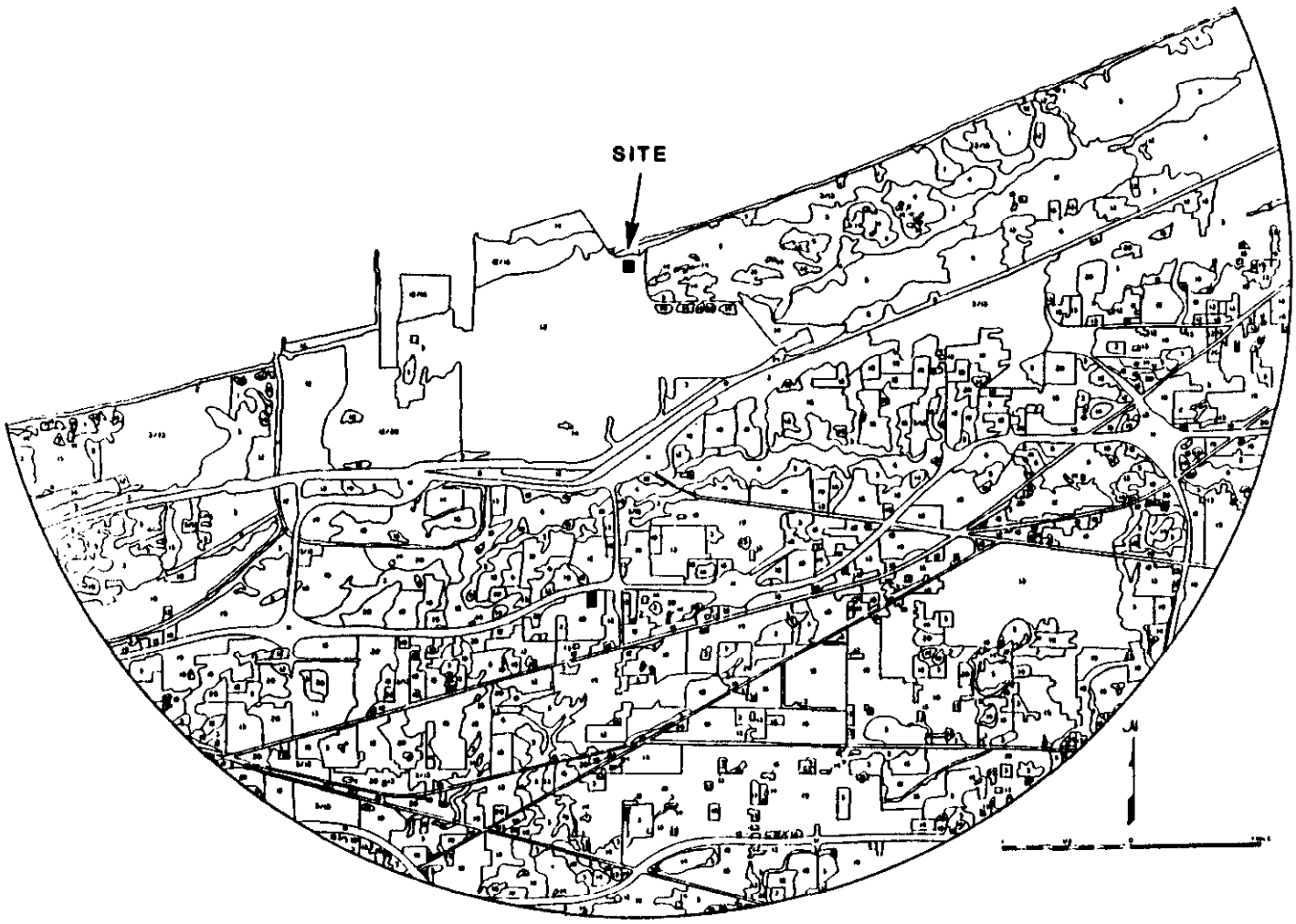
3.4.1.1 Vegetation

Figure 3.4-1 presents a graphic analysis of the vegetation within a 5-mile radius of the station. The mid-beach supports a few hardy pioneer plant species (i.e., coarse plants such as the cocklebur and sea rocket). Immediately adjacent to this area, the plant community consists of American beachgrass which is a clump type serving to stabilize the sands. These plants and other grasses are typical of a beach succession ecosystem. In some areas successful changes may be inhibited or halted along Lake Michigan by the constant shifting of sands, a feature of the normal development of such an ecosystem.

The dune line (foredune) has both active and temporarily stabilized dunes. Many of the stabilized dunes have forest vegetation, but none is climax. The dominant plants on the more stable foredunes are shrubs, such as cherry and little bluestem grass. Vegetation first develops on the leeward (south) side of the dunes. The ridges are dominated by open forest stands of small black oak, jack

# VEGETATION ANALYSIS

**WITHIN A 5-MILE RADIUS OF THE BAILLY STATION SITE**




**LEGEND**

| | |
|---|---|
| 1 Beachgrass | 11 Highway Right-of-Way |
| 2 Beach | 12 Industrial Commercial |
| 3 Black Oak | 13 Residential |
| 4 Wooded Swamp | 14 Open Water |
| 5 Marsh | 15 Dunes |
| 6 Red Maple/Lowland Hardwoods | 16 FWI |
| 7 Conifers | 17 Swamp White Oak |
| 8 Transmission Corridor | 18 Open Field |
| 9 Orchard | 19 Cultivated Field |
| 10 Military Reservation | 20 Mixed Vegetation |

*Prepared from color infrared photography obtained on* June 12, 1974. Field checked and revised April, 1975.

Source: Texas Instruments, Inc., "1974-1975 Annual Report-Bailly Nuclear I Site"

Pure Air
a joint venture company
ADVANCED FLUE GAS DESULFURIZATION

Vegetation Analysis

Figure 3.4-1

pine, large tooth aspen, chokecherry and witch hazel. Herbaceous forms such as false solomon's seal, bearberry, huckleberry, sunflower, and bittersweet predominate and are interspersed with seedlings and saplings of black oak and basswood in the understory. White pine are present principally as mature trees. On active dunes, the north-facing slopes are covered with bearberry, common junipers, cottonwood, and willow and provide good vertical and horizontal wind shielding.

Forest communities are adjacent to the dunes. The canopy trees are almost all black oak, although basswood is occasionally present. Oak seedlings, wild cherry, sassafras, and witch hazel comprise the understory. The oak forest is classified as both immature and mature. The vegetational array is similar in these two habitats, but the mature forest has older oaks and a more spotty distribution of herbaceous plants and woody shrubs. Shade-tolerant forms such as bracken fern live under the oaks. There are open areas of sand which are stabilized by sedges and little bluestem grasses. In general, as one goes inland the soils become increasingly clayey (lacustrine deposits) so that they have a higher water and nutrient retention than the dunes. The forests provide diverse microhabitats in the rotting logs, fallen leaves and branches of the forest litter.

The National Lakeshore has a native stand of predominantly red maple and white oak. Sassafras trees and large black oaks are occasionally found in this forest habitat with some 12 additional tree species. Most of the saplings are flowering dogwood and red maple. Arrowwood seedlings form dense clumps.

Old field habitats exist within the boundaries of the National Lakeshore. Ponds are common in the sand dunes of the National Lakeshore. Old field vegetational types are

characteristically mosses, sedges and grasses, cattails and herbs, and maple, cherry and oak saplings.

Cowles and Pinhook Bogs are located to the east of the station and present a classic picture of a bog ecosystem. These are so-called quaking bogs because they have floating mats of sphagnum moss surrounding areas of open water. Other plants are arborvitae and tamarack trees, species which are rare or absent in other places in Indiana. The soils in the bogs support a variety of small indigenous plants such as pitcher plant, cranberry, dwarf birch, leather leaf, bog rosemary, sundew and lady's slipper orchid. There are dense stands of cattails in the center of Cowles Bog. Floating vegetation mats support large numbers of insects.

3.4.1.2 Vertebrates

Vertebrates in the Bailly Generating Station area include small rodent species such as white-footed mice, shrews, voles and squirrels, as well as opossum, skunk, rabbit and woodchuck. Scats (animal feces) or footprints of deer, raccoon and fox have been observed in the area.

Lower vertebrates encountered in the station area include the red backed salamander, green frog, wood frog, garter snake and Dekay's snake.

Seventy-nine species of birds have been identified in the station area. Eighteen are permanent residents, 29 are summer residents, six are winter residents, and 26 are migrants. Table 3.4-1 lists the most abundant species in the area. A bald eagle, a rare and endangered species throughout the continental United States has been seen in the National
E-40 Lakeshore; however, it has been established that the species is not a resident of, or nests in the Lakeshore area (Appendix A). The eagle is a migratory bird, and makes its

TABLE 3.4-1: ABUNDANT BIRD SPECIES KNOWN TO NEST IN THE INDIANA DUNES AREA

Common Name

Pied-billed Grebe
Great Blue Heron
Green Heron
Canada Goose
Mallard
Blue-winged Teal
Turkey Vulture
Red-tailed Hawk
Common Bobwhite
Sora
Common Gallinule
American Coot
Killdeer
American Woodcock
Spotted Sandpiper
Black Tern
Rock Dove
Mourning Dove
Yellow-billed Cuckoo
Chimney Swift
Belted Kingfisher
Common Flicker
Red-headed Woodpecker
Downy Woodpecker
Eastern Kingbird
Great Crested Flycatcher
Acadian Flycatcher
Willow Flycatcher
Eastern Wood Peewee
Horned Lark
Tree Swallow
Bank Swallow
Barn Swallow
Purple Martin
Blue Jay
Common Crow
Tufted Titmouse
House Wren
Marsh Wren
Gray Catbird
Brown Trasher
American Robin
Wood Thrush
Veery
Cedar Waxwing
Starling
Yellow-throated Vireo
Red-eyed Vireo
Warbling Vireo
Blue-winged Warbler
Yellow Warbler
Cerulean Warbler
Ovenbird
Common Yellowthroat
American Redstart
House Sparrow
Bobolink
Eastern Meadowlark
Red-winged Blackbird
Northern Oriole
Common Grackle
Brown-headed Cowbird
Scarlet Tanager
Cardinal
Rose-breasted Grosbeak
Indigo Bunting
American Goldfinch
Rufous-sided Towhee
Chipping Sparrow
Field Sparrow
Swamp Sparrow
Song Sparrow

Source: Krekeler, Carl H.: Ecosystem Study of the Indiana Dunes National Lakeshore, National Lakeshore Research Program Report No. 81-01, 1981.

habitat in bluffs and flood plains, and around lakes, rivers, seacoasts and mangroves.

Within the vicinity of the Bailly Station are flyways (migration corridors) of several types of migratory waterfowl including the "dabbling ducks" (such as the mallard, black duck and pintail), the "diving ducks" (such as the redhead and canvasback), Canada goose and the blue goose, also known as the "lesser snow goose." These birds rest in the nearshore waters of the lake and in the interdunal ponds near the lake. The latter provides a protected resting and feeding area, especially valuable when the lake is turbulent.

E-38
E-59 No threatened or endangered amphibian, reptile, bird or mammalian species are presently known to reside within the confines of the Bailly Generating Station. Due to heavy human habitation and the encroachment of industry along the Lake Michigan shoreline of the Chicago-Hammond-Gary area, the Indiana Dunes National Lakeshore and surrounding forested areas provide habitat for a number of species once present throughout the area (Appendix A).

### 3.4.2 Aquatic

#### 3.4.2.1 Fish

Fourteen fish species in seven families have been verified in Lake Michigan and several ponds proximal to the Bailly Station (there are no ponds on the Northern Indiana property). Five of these were salmonids, and salmonids comprised the third largest number of organisms, except for alewives and spottail shriners. Perch were also an important species. There are no data to indicate the presence of rare or endangered fish species in the aquatic community (lake, rivers, bogs, marshes, streams, ponds) in the Bailly Station

vicinity. Table 3.4-2 lists the fish species identified in the area.

The Bailly Station's thermal plume in Lake Michigan supports moderate to heavy sport fishing in the summer. The fish near the station, probably attracted by the warmer water of the plume, include such game fish as yellow perch, bluegill and largemouth bass. Several species of minnows and two species of suckers have been found. These fish are important as forage for the game species but are not sought after for sport or food. Five species of importance for sport or food, especially in spring, are coho salmon, lake trout, steelhead trout, chinook salmon and alewives. Other fish of marginal importance, such as carp, bullhead and goldfish, may also appear near the station.

Three fish species have been were verified in ponds in the Bailly Station vicinity, including the green sunfish, mudminnow, and black bullhead, with the green sunfish apparently the most abundant species.

3.4.2.2 Benthos

The hard sand bottom and seasonal water temperatures along the shores of Lake Michigan restrict the numbers and types of soft-bodied, bottom-dwelling macro-invertebrates. Tubificid worms are normal inhabitants of Lake Michigan bottom sediments and have been estimated to comprise slightly more than half of the total benthic organisms present. Some species are highly pollution tolerant. Most of the other species of benthic organisms are of a type characteristic of conditions elsewhere in the lake. Represented are leeches, fingernail clams, scuds and midge larvae. Crayfish have also been observed in the station area. The Bailly Station region has extensive areas of

TABLE 3.4-2: FISH SPECIES VERIFIED IN THE AQUATIC COMMUNITY OF THE BAILLY GENERATING STATION AND ITS VICINITY

| Scientific Name | Common Name |
|---|---|
| Family Clupeidae | Herring Family |
| Dorosoma cepedianum | Gizzard Shad |
| Alosa pseudoharengus | Alewife |
| Family Salmonidae | Salmon, Trout and Whitefish Family |
| Oncorhynchus tschawytscha | Chinook Salmon |
| Oncorhynchus kisutch | Coho (Silver) Salmon |
| Salmo trutta | Brown Trout |
| Salmo gairdneri | Rainbow (Steelhead) Trout |
| Salvelinus namaycush | Lake Trout |
| Coregonus clupeaformis | Lake Whitefish |
| Family Umbridae | Mudminnow Family |
| Umbra limi | Central Mudminnow |
| Family Cyprinidae | Minnow Family |
| Cyprinus carpio | (European) Carp |
| Notropis hudsonius | Spottail Shiner |
| Family Ictaluridae | Catfish Family |
| Ictalurus melas | Black Bullhead |
| Family Centrarchidae | Sunfish Family |
| Leponis cyanellus | Green Sunfish |
| Family Percidae | Perch Family |
| Perca flavescens | Yellow Perch |

Source: 1974-1975 Annual Report - Bailly Nuclear-1 Site, prepared for Northern Indiana Public Service Company by Texas Instruments Inc., Dallas, TX: June 1975.

riprap, a favorite habitat of crayfish. Crayfish are a valuable food source for many fish, especially yellow perch.

Table 3.4-3 identifies the macroscopic animals native to the ponds, bogs, creeks, rivers, marshes and ditches that are part of the non-Lake Michigan aquatic community that surround the Bailly Station site.

3.4.2.3 Zooplankton

Zooplankton, by nature of their trophic (feeding) position, serve as the interface between energy contained in the lower trophic levels and the energy requirements higher in the food chain. In a 1970 study conducted by Texas Instruments of the ecosystems in the Bailly Station vicinity, 111 taxa of zooplankton were identified, 46 percent of which were cladocerans, 35 percent copepods, and 19 percent non-crustacean invertebrates. (It should be noted that during this study, zooplankton samples were collected on one day only.) Of these, Bosmina longirostris and copepod copepodids were the most ubiquitously appearing organisms, both temporally and spatially. Other organisms occurring regularly included Cyclops bicuspidatus thomasi, Daphnia retrocurva (lake stations), and Chironomidae larvae (pond stations). Numerical density ranged from 0.44 to 117.79 organisms/liter in the lake and 50.00 to 964.74 organisms/liter in the sampled ponds, a further indication of the higher productivity in the ponds. Spatial and temporal statistical differences were detected between groups of zooplankton stations. These differences reflect the changing habitat or niche structure at the various stations with changing seasons and current characteristics.

Compilation of zooplankton species composition and quantitative distribution indicates that these microcrustaceans were over three times more abundant within

TABLE 3.4-3: BENTHOS COMMON TO NON-LAKE MICHIGAN AQUATIC COMMUNITIES OF THE BAILLY GENERATING STATION AND ITS VICINITY

| Family Name | Common Name |
|---|---|
| Libellulidae | Dragonflies |
| Coenagrionidae | Damselflies |
| Corixidae | Water Boatmen |
| Nepidae | Water Scorpions |
| Gerridae | Water Striders |
| Mesoveliidae | Water Treaders |
| Lymnaeidae | Pond Snails |
| Aeschnidae | Dragonflies |
| Notonectidae | Backswimmers |
| Hebridae | Velvet Water Bugs |
| Gyrinidae | Whirligig Beetles |
| Hydrophilidae | Water Scavenger Beetles |
| Chrysomelidae | Leaf Beetles |
| Gammaridae | Scuds |
| Hydracarina | Water Mites |
| Physidae | Pouch Snails |
| Hirydinea | Leeches |
| Chironomidae | Midges |
| Ephemeroptera | Mayflies |
| Lestidae | Damselflies |
| Belostomatidae | Giant Water Bugs |
| Veliidae | Smaller Water Striders |
| Dytiscidae | Predaceous Diving Beetles |
| Planorbidae | Orb Snails |
| Sphaeriidae | Fingernail Clams |
| Haliplidae | Crawling Water Beetles |
| Astacidae | Crayfish |
| Pleidae | Pygmy Backswimmers |
| Sialidae | Alder Flies |
| Gelastocoridae | Toad Bugs |
| Asellidae | Sow Bugs |
| Elmidae | Riffle Beetles |
| Naucoridae | Creeping Water Bugs |

Source: Krekeler, Carl H.: Ecosystem Study of the Indiana Dunes National Lakeshore, National Lakeshore Research Program Report No. 81-01, 1981.

the thermal plume than outside of it. These data suggest that certain species of zooplankton are either seeking out the warmer water of the plume, reproducing faster in the warmer discharge water, or a combination of the two factors.

A large portion of the zooplankton found in the thermal plume had large infestations of fungus on their bodies. This was especially apparent in Eurytemora affinis and Daphnia retrocurva, the two most abundant organisms in the thermal plume. These same species outside of the thermal plume did not exhibit any infestations of fungus. Copepods and cladocerans in Lake Michigan are rarely observed infested with fungus in offshore waters, but this sometimes occurs in polluted areas such as in southern Green Bay.

3.4.2.4 Phytoplankton

Phytoplankton populations in Lake Michigan reflect seasonal changes in available light, temperature, nutrients and predation. Diatoms dominate the lake flora from mid-fall through early spring. Blue-green algae become briefly dominant in late spring, and green algae dominate in the summer. Diatoms and green algae share dominance in the ponds.

Productivity levels in the lake are very low, particularly as compared to nearby river systems. Productivity levels in the ponds are somewhat higher but still within a low range. A relationship between productivity, biovolume and density of the phytoplankton is apparent. Productivity at the lake stations in the discharge plume is negligible in all months except August, and levels are lower than in the lake, indicating some localized inhibition of the phytoplankton population.

After diatoms, the predominant algal group is the dinoflagellates (Pyrrophyta). Ceratium hirudinella and Peridinium sp. are the most abundant dinoflagellates. These forms have been previously reported from Lake Michigan but not in these concentrations. These organisms are especially abundant in the warm water discharge.

Blue-green algae (Cyanophyta) are especially abundant in the warm water. The major species in this population is Gomphosphaeria lacustris.

Other golden-brown algae and green algae are present in smaller concentrations. Dinobryon sp. is commonly found throughout Lake Michigan. The green algae Scenedesmus protuberans is found throughout the area aquatic habitats. This algae is found in highest volumes in Burns Ditch. With increasing distance from Burns Ditch, this species is found in less volume. This condition is an indication that water and related materials from Burns Ditch are drifting eastward into the vicinity of the Bailly Station discharge plume.

Periphyton are abundant in the discharge area of the station in summer and fall. Most of the genera collected are found in the lake in normal and unpolluted situations. Cladophora glomerata and Lyngbya dignetti, filamentous green and blue-green algae, respectively, are the first and second most common forms encountered near the Bailly Station. Although Cladophora is normally observed in shoreline habitats of Lake Michigan, it should be noted that its growth is responsive to temperature and nutrient concentration. Under conditions of accelerated growth this species has become a nuisance since it can slough off of its substrate, wash ashore, and decompose, producing foul odors. The attached algae harbors several protozoan species and small crustaceans (Gammarus sp.).

## 3.5 SOCIOECONOMIC RESOURCES

### 3.5.1 Population

The residential populations for the incorporated towns within five miles of the Bailly Station are given in Table 3.5-1. In 1989, approximately 42,081 individuals lived in the area. The smallest town, Dune Acres, is a private community to which the public in general is not admitted, and is the closest to the Northern Indiana property. Portage is the largest city in the 5-mile vicinity, with a population in 1980 of 27,409.

In 1980, the population of Porter County was 119,816. It is projected to be 127,850 in 1990. No population projections are made below the county level, so no data are available on migrational trends. The available labor force in 1987 was 53,500 with a 7.6 percent unemployment rate countywide. Unemployment figures for individual communities are not available, so no estimate can be made of the unemployment rate within the Bailly Station vicinity.

### 3.5.2 Land Usage

#### 3.5.2.1 Regional

Figure 3.2-4, presented previously in Section 3.2, graphically depicts the regional land use around the Bailly Generating Station. The Bethlehem Steel Corporation, Burns Harbor complex borders the site on the west and south perimeter. The east and south sides of the site are bordered by the Indiana Dunes National Lakeshore Park and Highway 12, respectively. E-41

TABLE 3.5-1: POPULATION DATA FOR INCORPORATED(1) COMMUNITIES WITHIN FIVE MILES OF THE BAILLY GENERATING STATION

| Community | Miles/Direction From Site | | Census 1970 | Census 1980 | % Change |
|---|---|---|---|---|---|
| Dune Acres | 2.0 | ENE | 301 | 291 | -3.3 |
| Burns Harbor | 2.5 | SSW | 1,284 | 920 | -20.2 |
| Porter | 3.2 | SE | 3,058 | 3,441 | 12.5 |
| Ogden Dunes | 3.5 | WSW | 1,361 | 1,489 | 9.4 |
| Portage | 4.5 | SSW | 19,127 | 27,409 | 43.3 |
| Chesterton | 4.5 | SE | 6,177 | 8,531 | 38.1 |
| Porter County | - | | 87,114 | 119,816 | 37.5 |

Note to Table 3.5-1:

(1) No census data are kept on unincorporated communities.

Sources: U.S. Department of Commerce, Bureau of the Census. U.S. Census of Population: 1980. Number of Inhabitants, Indiana.

Northwestern Indiana Regional Planning Commission, County Profile: Porter County

From the Bailly Station out to two miles very little permanent residential population exists because of the wide use of the land for purposes other than housing. No applications for industrial building permits have been filed since 1988. A windshield survey of the Lakeshore area (January 1989) revealed a moderate amount of residential construction underway. Within selected portions of a 5-mile radius of the Bailly Station, however, almost no new homes or condominia were observed under construction.

### 3.5.2.2 Industrial

The area around the site, and in particular the area to the west, is very heavily industrialized. Lake County, five miles west of the site, includes Gary, Hammond and East Chicago, all of which are centers of heavy industry, particularly the steel manufacturing industry. Besides the steel industry, construction companies and firms producing fabricated metal products as well as petroleum and coal products have sizeable numbers of employees. Table 3.5-2 illustrates the larger manufacturing concerns in the region. Nearly half of the work force in Porter County is involved with manufacturing, and much of this work force is employed by Bethlehem Steel adjacent to the Bailly Station.

### 3.5.2.3 Agricultural

Very little of the land north of Highway 12 is either suitable or used for agriculture. To the south of the Indiana Toll Road, the land in Porter, Lake, and LaPorte Counties is largely devoted to growing corn and soybeans. Approximately 60 percent of the land in Porter County is used for agricultural purposes.

TABLE 3.5-2: MAJOR[1] MANUFACTURING ACTIVITY WITHIN A 5-MILE RADIUS OF THE BAILLY GENERATING STATION

| City | Miles/ Direction from Site | Industry | Product | No. of Employees |
|---|---|---|---|---|
| Chesterton | <1/SE | Bethlehem Steel (Burns Harbor) | Steel mill | 6,200 |
| Chesterton | 4.5/SE | Luria Brothers | Scrap metal processing | 122 |
| Chesterton | 4.5/SE | Manley Brothers | Stone, clay, glass products | 125 |
| Portage | 4.5/SSW | Bethlehem Steel | Steel mill | 6,000 |
| Portage | 4.5/SSW | The Levy Co. | Stone, clay, glass products | 300 |
| Portage | 4.5/SSW | Metro Metals Corp. | Steel foundry | 150 |
| Portage | 4.5/SSW | National Steel Corp. (Midwest Div.) | Steel mill | 1,700 |

Notes to Table 3.5-2:

(1) "Major" manufacturers include those industries with 100 or more employees.

Sources: Indiana Manufacturers Directory, Manufacturers News, Inc. Chicago: 1988.

Iron and Steel Plants Directory, Association of Iron and Steel Engineers. Pittsburgh: 1986.

The Dun & Bradstreet Corporation, Million Dollar Directory. Parsippany, NJ: 1988.

### 3.5.3 Public Services

#### 3.5.3.1 Schools, Hospitals and Nursing Homes

Table 3.5-3 lists the six hospitals within a 12-mile radius of the Bailly Generating Station and their respective bed counts. There are no hospitals within five miles; the closest major hospital to the station is Porter Memorial in Valparaiso.

Table 3.5-4 describes the number of public schools in the subject area and provides total student enrollment. Public special education, elementary, junior high and high schools are covered by these data. Day care centers and pre-school facilities are not required to be monitored by the Indiana Department of Education, so no enrollment or location information is available.

Table 3.5-5 indicates the nursing homes and number of beds in the station area.

#### 3.5.3.2 Transporation

The site is located in an area where access to transportation facilities is readily available. The two-lane Highway 12 borders the site boundary on the south as does the Chicago South Shore & South Bend Railroad (CSS&SB). A six-lane segment of an interstate highway, I-94, is located about four miles south of the site; another four-lane road, Highway 20, is situated 2.5 miles southeast of the site. Because the Bailly Station is located on the edge of Lake Michigan, it is possible to reach it by way of the lake. Figure 3.5-1 indicates the various routes of transportation near the station. Northern Indiana has a relatively high density of railroad mainlines and principal highways that feed into Chicago from the east and south. The railroad

TABLE 3.5-3: HOSPITALS WITHIN A 12-MILE RADIUS OF THE BAILLY GENERATING STATION

| Hospital | Location | No. of Beds |
|---|---|---|
| Porter Memorial | Valparaiso | 379 |
| Methodist | Gary | 355 |
| St. Mary Medical Center | Hobart | 300 |
| Michigan City Memorial | Michigan City | 102 |
| St. Anthony | Michigan City | 190 |
| Kingwood | Michigan City | 89 |

Source: Indiana Department of Public Health, Acute Care Services Division, Indianapolis, IN. Personal communication: January 1989.

TABLE 3.5-4: PUBLIC SCHOOL ENROLLMENT FOR COMMUNITIES WITHIN A 12-MILE RADIUS OF THE BAILLY GENERATING STATION

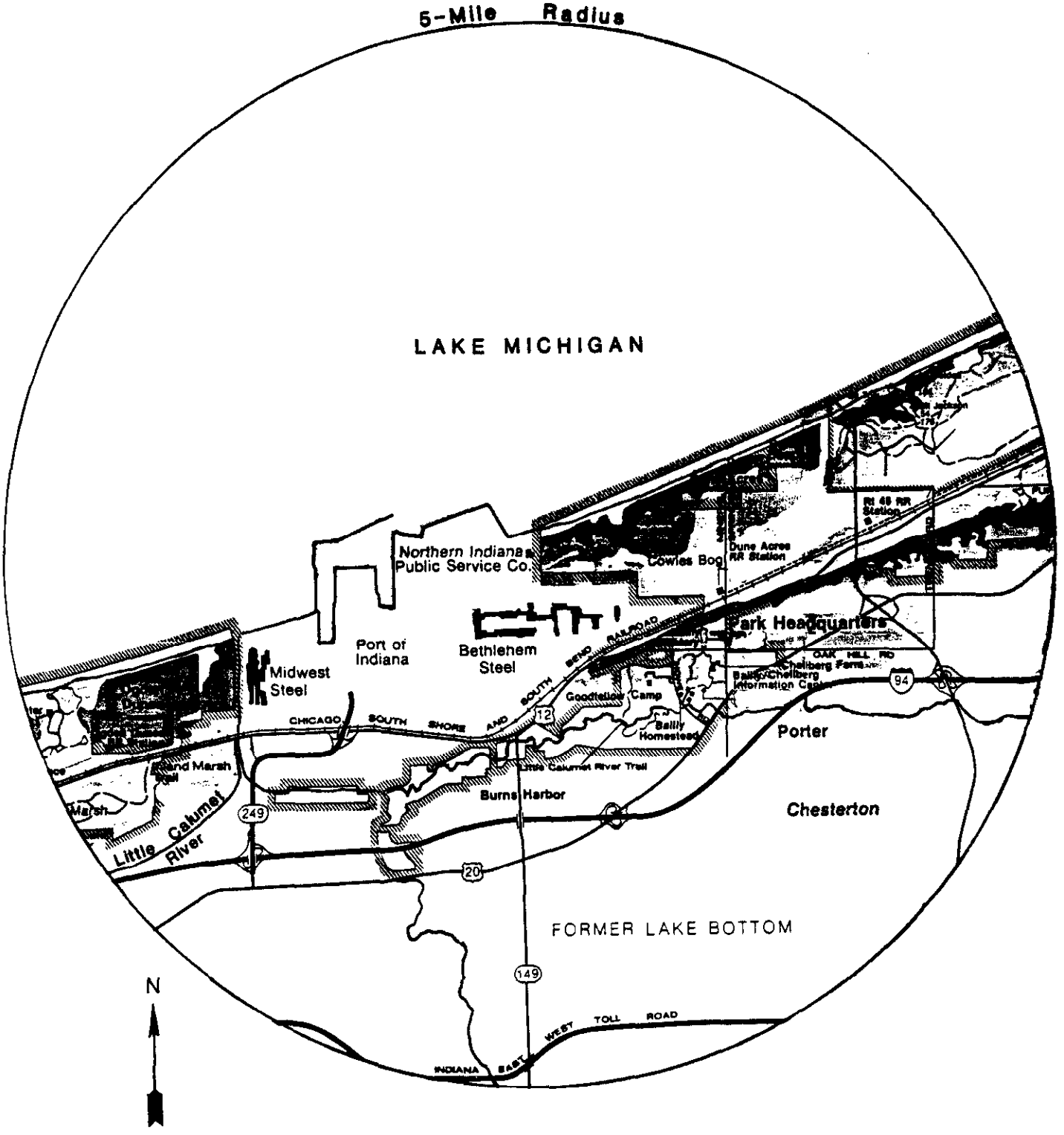
| Community | No. of Schools | 1988 Pupil Enrollment |
|---|---|---|
| Chesterton | 6 | 4,018 |
| Porter | 1 | 353 |
| Portage | 9 | 8,059 |
| Hebron | 3 | 1,425 |
| Valparaiso | 19 | 8,737 |

Source: Indiana Department of Education, Educational Information, Indianapolis, IN. Personal communication: January 1989.

TABLE 3.5-5: NURSING HOMES AND BED TOTALS WITHIN A 12-MILE RADIUS OF THE BAILLY GENERATING STATION

| Community | No. of Nursing Homes | Total Beds |
|---|---|---|
| Chesterton | 1 | 100 |
| Portage | 2 | 215 |
| Valparaiso | 4 | 578 |

Source: Indiana Department of Public Health, Health Facilities Division, Indianapolis, IN. Personal communication: January 1989.




Source: Indiana Dunes National Park map, distributed by the National Park Service.

Pure Air
a joint venture company
ADVANCED FLUE GAS DESULFURIZATION

Major Roadways and Recreational Land Use

Figure 3.5-1 E-3, 42

lines that were operating within a 10-mile radius of the Station in 1988 include Conrail and CSX. Direct commuter passenger service to the station entrance is available via the CSS&SB electrified railroad.

Several principal highways pass within 10 miles of the station, including Interstate Highways 80, 90 and 94, 20, 12 and 6, all of which run in general east-west direction. Interstate 65 runs north-south through Gary. Highway 12, known also as the Dunes Highway, passes closest to the lakeshore, and the station entrance road leads directly to Highway 12. At present Highway 12 passes directly through land that is now part of the National Lakeshore. A study by the National Park Service (NPS) is in progress to determine the feasibility of re-designating Highway 12 as a parkway according to NPS standards. Approval of the request by Congress would affect truck traffic along the highway by the Bailly-Bethlehem Steel sites. Results of the study are expected sometime in 1991.

3.5.3.3 Historical Sites and Natural Landmarks

There are no state-supported historical sites in Porter County. On the federal level, the Joseph Bailly Homestead and Cemetery are located within two miles of the Bailly Generating Station (Appendix B). The Bailly Homestead is listed in the National Register of Historic Places. E-64

The South Shore Station at Beverly Shores has been nominated to the National Register of Historic Places as the only surviving example of stations from the early period of South Shore history. Northern Indiana owns the property on which the South Shore Station sits; it is approximately 10 miles from the Bailly Station. The National Park Service has approved the application; the state is currently reviewing

it. If the site passes state criteria, it will be submitted to and reviewed by the National Register of Historic Places.

There are no known significant deposits or archaeological materials within the Bailly Station boundaries, although three Registered Natural Landmarks are located within a few miles of the site. Cowles Bog, the closest, lies immediately to the east of the station boundary. Dunes Nature Preserve is located within the Indiana Dunes State Park between the towns of Dune Acres and Beverly Shores. Pinhook Bog is situated about 12 miles east of the station.

3.5.3.4 Recreation

Except for the three miles of industrial lakeshore occupied by the Bailly Station, the steel mill properties, and the Port of Indiana, most of the 15 miles of lakeshore in Porter County is used as either public or private swimming beach. Because of the natural sand accumulation, the water is generally shallow within 50 feet of the shore line and is thus a relatively safe water-sport area. The boat docks in the area are primarily in the private marinas that line the shore of Burns Ditch and the public harbor at Michigan City.

The Indiana Dunes State Park and the Indiana Dunes National Lakeshore occupy the area to the east and south of the station. It consists of about 8,000 acres of lakeshore, bogs and marshes. Public Law, 89-761, passed in November 1966, authorized the Secretary of the Interior to establish The Indiana Dunes National Lakeshore when sufficient lands had been acquired to be administered effectively as a unit. The Lakeshore was formally established in 1972 and is now administered by the National Park Service.

Fishing in Lake Michigan is a popular recreational pastime. Anglers fish from boats anchored near the end of the Bailly circulating water discharge plume where salmon, trout and perch are frequently in abundance. The construction and operation of the AFGD system will not prevent anglers from continuing to use this excellent fishing spot.

Inland fishing is very limited. The inland lakes are not stocked by the Department of Natural Resources so local fisherman deplete the fish population by the end of the season. Lake Palomara in Chesterton has no fish in it at all. Local fisherman also fish in the Kankakee and Little Calumet Rivers, and on a chain of small lakes in the Valparaiso area.

Figure 3.5-1 depicts some of the recreational uses of land within a 5-mile radius of the Bailly Generating Station.

## 3.6 ENERGY AND MATERIALS RESOURCES

Northern Indiana currently operates two electric generating units at the Bailly Generating Station. The units are coal-fired and rated at 528 MW total for both. The station consumes approximately 1.1 million tons of coal per year to generate almost 3,200,000 MWH, of which the station consumes 200,000 MWH. Natural gas can also be used as an alternative fuel. The coal is delivered to the station by railcar and stockpiled at the site, whereas the natural gas is delivered by an underground pipeline.

The generating station receives process/cooling water from Lake Michigan at an average of 221 million gallons per day (MGD).

Every two to three years the station must dredge the area surrounding the intake pipe. The dredging is done with the approval of the Army Corps of Engineers and is permitted by the Indiana Department of Natural Resources. The material dredged is generally used for beach enrichment at area beaches.

## 3.7 REFERENCES


1. Collings, Edith. Indiana Department of Public Health, Acute Care Division. Indianapolis, Indiana. Personal communication: January 1989.

2. Directory of Iron and Steel Plants. Association of Iron and Steel Engineers. Pittsburgh, Pennsylvania: 1986.

3. Dorell, Susie. State Board of Health, Division of Public Health Statistics. Indianapolis, Indiana. Personal communication: January 1989.

4. Federal Emergency Management Agency. Flood Insurance Study, County of Porter, Indiana Unincorporated Areas, 1981. E-58

5. Federal Emergency Management Agency. Flood Insurance Study, Town of Burns Harbor, Indiana Porter County, 1980. E-58

6. Federal Emergency Management Agency. Flood Insurance Rate Maps: County of Porter, Indiana (Unincorporated Areas). Community-Panel Number 180425 0025B. 1982. Town of Dune Acres, Indiana Porter County. Community-Panel Number 180205 0001 B, 1981. E-58

7. Federal Emergency Management Agency. Flood Boundary and Floodway Maps: County of Porter, Indiana (Unincorporated Areas). Community-Panel Number 180425 0001-0190. 1982. Town of Burns Harbor, Indiana Porter County. Community-Panel Numbers 180207 0001 B and 180207 0001-0002, 1981. E-58

8. Harris, Rick. National Park Service, Resource Management. Indiana Dunes National Lakeshore, Porter Indiana. Personal communication: January 1989.

9. Indiana Business Research Center. Indiana University School of Business, Bloomington, Indiana. Personal communication: January 1989.

10. Indiana Department of Environmental Management, Meteorological Data (1984-1986). Compiled for Porter County State Implementation Plan (SIP), Data from Dunes Acres. E-33

11. Indiana Manufacturers Directory. Manufacturers New, Inc. Chicago, Illinois: 1988.

REFERENCES (Continued)


12. Krekeler, Carl H.; Reshkin, Mark; Kiefer, Wayne E.; Weber, Neil V.; Brunansky, Louis; EcoSystem Study of The Indiana Dunes National Lakeshore, Vols. One and Two. Indiana Dunes National Lakeshore Report Research Program, Program 81-01. National Park Service, Midwest Region: 1981.

13. Lane, Karen. Indiana Department of Education, Educational Information Systems, Indianapolis, Indiana. Written communication: January 1989.

14. Martin, Michelle L., Indiana Natural Heritage Program, Division of Nature Preserves, Indiana Department of Natural Resources. Indianapolis, Indiana. Written communication: January 1989.

15. Meyers, Robert A., ed. Coal Handbook. Marcel Dekker, Inc. New York, NY: 1981.

16. Northern Indiana Public Service Company. Annual Report - Bailly Nuclear-1 Site. Prepared by Texas Instruments Inc., Ecological Services. Dallas, Texas 1974 - 1981.

17. Northern Indiana Public Service Company. Bailly Generating Station Nuclear 1 - Environmental Report. 1981.

18. Northern Indiana Public Service Company. Bailly Generating Station Nuclear 1 - Final Environmental Statement Related to Construction, 1973.

19. Parch, Dori, Historian. Indiana Dunes National Lakshore, Porter, Indiana. Personal communication: January 1989.

20. Pierce, Frances, Indiana Department of Public Health, Health Facilities Divison. Indianapiolis, Indiana. Personal communication: January 1989.

21. Porter County Convention, Recreation and Visitor Commission. Chesterton, Indiana. Written communication: January 1989.

22. Porter County $SO_2$ Modeling Analysis, Indiana Department of Environmental Management, Office of Air Management, Indianapolis, IN. June 1988

REFERENCES (Continued)


23. Rand McNally Handy Railroad Atlas, Rand McNally Company, 1985.

24. Rhein, Lauren. Census and Statistical Data Center. Local Population Estimates, 1982, 1984 and 1986; Population Projections, 1990 - 2020; County Profile: Porter County; Community Profiles: Burns Harbor, Chesterton, Dune Aces, Portage, Ogden Dunes, Porter. Northwestern Indiana Regional Planning Commission, Highland, Indiana. Written communication: January 1989.

25. Studies to Support the Use of ISCST (Rural) for SIP Development in Porter, County, Indiana, Enviroplan, February 3, 1988.

26. U.S. Department of Commerce, Bureau of Census. U.S. Census of Population: 1980 - Number of Inhabitants, Indiana. Washington, D.C.: U.S. Government Printing Office, 1982.

# 4.0 CONSEQUENCES (IMPACTS) OF THE PROJECT

## 4.1 ATMOSPHERIC IMPACTS

### 4.1.1 Construction

The potential for air pollution, as a result of site preparation and other construction-related activities, from airborne dust or occasional smoke is small and directly affected by seasonal and daily weather variations. This potential is not considered a hazard to normal activities within or adjacent to the industrial complex surrounding the Bailly Station. In addition, water will be sprayed on roads when necessary, to reduce fugitive dust during construction. E-43

### 4.1.2 Operation

During operation, both emissions and ground-level concentrations of $SO_2$ will be reduced. When the AFGD system is not in operation or during an upset condition, combustion products will be directed through the existing stack. Combustion products will be within existing Bailly Station emission permit requirements as discussed in Section 5, Permit Requirements. Thus, no additional impact than that currently prevailing will be observed. The area is currently classified as an attainment area with respect to $SO_2$. During operation total $NO_x$ emissions will remain unchanged, although concentrations of $NO_x$ at ground level may increase as a result of the lower temperature of the plume. Modeling using ISCST (Rural) indicated that no contravention of National Ambient Air-Quality Standards will result. E-44

The fugitive emissions from the station may increase due to transfers of pulverized limestone at the site. The limestone will be delivered by truck and

transferred to a storage silo. Transfer to the AFGD system will be accomplished pneumatically. However, these small fugitive emissions should not cause any discomfort to visitors to the National Lakeshore or to residents of nearby
E-45 communities. This will be assured by compliance with applicable fugitive dust regulations.

The only air emissions from the AFGD system are in the flue gas exiting the scrubber and stack. The existing and new emission rates and emission standards for the regulated compounds are as follows:

| Compound | Emissions Without AFGD (LB/MMBtu) | AFGD Emissions (LB/MMBtu) | Existing Emission Standard (LB/MMBtu) |
|---|---|---|---|
| $SO_2$ | 5.2 | 0.52 | 6.0 |
| $NO_x$ | 1.70 | 1.70 | N/A |
| Particulate Matter | 0.10 | 0.10 | 0.22 |

The AFGD system will reduce the $SO_2$ emission rate by 90 percent from 5.2 lbs/MMBtu to 0.52 lbs/MMBtu. This is a significant reduction in $SO_2$ emissions, and results in an $SO_2$ emission rate that is well below the New Source Performance Standard (NSPS) of 1.2 lb/MMBtu. The process does not reduce or increase the present $NO_x$ or particulate matter emission rates of 1.70 lb/MMBtu and 0.10 lb/MMBtu, respectively. The wet limestone slurry does not react with the $NO_x$ so that no $NO_x$ is removed in the $SO_2$ absorber.

No additional particulate matter is expected to be emitted as a result of the AFGD system. In practice, all FGD systems receive some amount of particulate (nominally 0.1 lb/MMBtu for the Bailly Station) from the electrostatic

precipitator. Approximately 50 percent of this particulate received from the ESP is removed by the AFGD system. The AFGD system in turn emits a minor amount (0.05 lb/MMBtu of scrubber generated particulate matter). Thus, there is no net increase in particulate matter as measured before and after the AFGD system.

## 4.2 LAND-USE IMPACTS

### 4.2.1 Construction

Land use impacts during the 24-month construction period are projected to be minimal, primarily as a result of the industrial nature of the Bailly Station. Additionally, the AFGD system will utilize less than two percent of the land presently dedicated to the Bailly Station.

Initial impacts will result from the installation of utilities and site preparation activities. Laydown areas will be provided for construction equipment, delivery and handling of materials. This land dedication of less than two acres will be temporary in nature, and following construction will be returned to its existing industrial state as debris, temporary structures, equipment and materials are removed.

No quantities of oil will be utilized during construction sufficient to cause a spill warranting immediate action. Any construction-related spills will be quickly contained by soaking into the soil's surface dressing. If necessary, the affected surface dressing will be removed from
E-47 the site for disposal in an appropriately-approved landfill. In the unlikely event of such an occurrence, response would be immediate in accordance with the Spill Prevention, Control and Countermeasure Plan that will be developed.

The construction phase will have a minimal effect on the recreational land area adjacent to the Bailly Station. The park area will be shielded from construction activities
E-70 by the "green belt." The green belt is a 300-foot "L" shaped parcel of land that bounds the eastern side of the Bailly Station and a portion of the northern boundary of the site; both segments abut part of the Indiana Dunes National Lakeshore. This parcel, owned by Northern Indiana, has been

left in its natural state to serve as a buffer zone as shown in Figure 3.2-3. The Bethlehem Steel Plant to the south and west should also be unaffected by construction because of its industrial environment.

There will be no impact of construction activity on historic resources. No historic structures or sites have previously been recorded on the Northern Indiana property. Further, the Joseph Bailly Homestead and Cemetery, approximately two miles from the site, are not projected to be impacted by construction related activities. Likewise, the South Shore Station, 10 miles from the construction site, proposed for inclusion in the National Register of Historic Places, will not be impacted by construction activity (Appendix B). E-64

4.2.2 Operation

Land-use impacts at the Bailly Station as a result of operations will be minimal since the AFGD system operation will be taking place on a heavily industralized site.

Currently Pure Air is facilitating negotiations with manufacturers of wallboard to become a supplier of gypsum. Successful negotation of a contract would result in this by-product being recycled into a useful product. Alternatively, the gypsum could be landfilled at an existing disposal site. Although this latter disposal option would consume approximately four acres of land annually, assuming disposal of 300,000 tons in 20-foot lifts, use of an existing appropriately-permitted landfill would result in minimal environmental impact. Currently there are landfills within Porter County that are appropriately permitted. E-46 E-49

The quantity of fly ash generated at the Bailly Station with the AFGD system will be slightly higher than

that generated by existing operations as a result of the WES. If beneficial uses for the fly ash are not determined, it
E-31 will be landfilled. This will involve the use of land that has already been dedicated for waste disposal and would have been used for normal station ash disposal. Thus, the AFGD system may have minimal impact on available landfill capacity and no impact on water quality.

Operation of the AFGD system is projected to have no impact on existing or proposed historic resources.

## 4.3 WATER-QUALITY IMPACTS

### 4.3.1 Ground Water

#### 4.3.1.1 Construction

The construction of the AFGD system at the Bailly Generating Station will not have any effect on the ground water in the area. There will be no materials used during the construction period that are expected to cause any problem with ground water.

Any construction-related oil spills will be quickly contained by soaking into the soil's surface dressing. If necessary, the affected surface dressing will be removed from the site for disposal in an appropriately-appoved landfill. In the unlikely event of such an occurrence, response would be immediate in accordance with the Spill Prevention, Control and Countermeasure Plan that will be developed. E-47

#### 4.3.1.2 Operation

The AFGD system will be designed to minimize wastewater generation. However, there will be wastewater from the sanitary system and some process-related high chloride wastewater. These wastewaters will be discharged to wastewater ponds at the Bailly Station. Permitting of this discharge is discussed in Section 5, Regulatory Compliance. E-48

As indicated previously, the process-related wastewater will be high in chloride concentration. However, it is unlikely that chloride will seep into the ground water since the ponds at the Bailly Station are sealed with clay and a membrane liner. The most recent results of ground water monitoring have shown no impact on the ground water.

The Indiana Department of Environmental Management (IDEM) has waived monitoring requirements for the Bailly Station because
E-61 of documentation of no seepage (Appendix C). Therefore, the operation of the AFGD system should pose no hazard to the ground water in the area.

E-46 Solid wastes (e.g., ash and gypsum) generated from
E-62 operation of the AFGD system may be put to beneficial use or disposed in previously mentioned appropriately-permitted state facilities. As discussed in Section 2.1.3.4, on-site gypsum will be stored in buildings prior to removal from the site and will be stored in a silo prior to use in the AFGD system. Thus, the impact on ground water should be minimal.

### 4.3.2 Surface Water

#### 4.3.2.1 Construction

Water for construction of the AFGD system would be obtained directly from Lake Michigan. This usage is not anticipated to have any effect on the lake, nor to affect recreation thereon. No additional outfall or docking facilities (permanent or temporary) are planned during construction of the AFGD system.

E-35 A review of the area wetlands (Figure 3.3-1) indicates that the AFGD system structures will not be built on any existing wetlands.

#### 4.3.2.2 Operation

Lake Michigan will provide all process water and meet other lesser water requirements, estimated to be 880 gallons per minute (gpm), or $70 \times 10^9$ gallons annually, at 100 percent operation. Emergency fire water will be supplied at 1000 gpm, if ever required. The lake will not be impacted

by this use, nor will the wetlands that are characteristic of the Lakeshore area.

Surface water impacts from the operation of the AFGD system will be negligible since the system will be designed to comply with existing NPDES permit conditions for the Bailly Station.

Small quantities of office waste materials, resulting from normal operations, will be stored in covered containers or trash bins to minimize potential contamination of surface water. These materials will consist primarily of paper, cardboard boxes, plastic bags, small cans, bottles and jars, light bulbs, food scraps and floor sweepings. Subsequently they will be disposed by a contract hauler. E-50

As discussed above, the ash generated from the AFGD system will be placed in a storage silo prior to removal from the site for disposal. Any material spilled around the silo will be picked up to avoid potential contamination of surface water, as is current practice. E-46

Limestone and gypsum also will be stored in buildings to prevent run-off to the surrounding area. E-46

The WES will be designed to evaporate part of the wastewater from the process, and result in lower water discharges from the process. Provisions will be made to dispose of the remainder of the process wastewater in on-site ponds. These ponds can be discharged to Lake Michigan on the north side of the station. The wastewater flow rate at normal AFGD system load and the estimated or predicted wastewater composition are shown in Table 4.3-1.

The quantity of the water shown in Table 4.3-1 is based on the assumption that the wastewater evaporation E-51 E-53

E-26
E-51

TABLE 4.3-1: PROJECTED WASTEWATER COMPOSITION FROM THE AFGD PROCESS TO ON-SITE PONDS

| Parameter | Level |
|---|---|
| Quantity, gpm | 116.8 (total flow) |
| Total Suspended Solids, wt.% | 5.6 |
| $CaSO_4 \cdot 2H_2O$ | 5.15 |
| Fly Ash & Inerts | 0.45 |
| Total Dissolved Solids, mg/l | |
| $Ca^{++}$ | 7,186 |
| $Mg^{++}$ | 4,035 |
| $SO_4^{=}$ | 1,293 |
| $Cl^{-}$ | 23,072 |
| $F^{-}$ (total) | 1,095 |
| $S_2O_6^{=}$ | 605 |

system is not operating. Even under this extreme condition (based on discussions with the Indiana Department of Environmental Management, Office of Water Management), the projected wastewater discharge composition for key parameters will be below preliminary water quality standards which are based on permit limits in the receiving water body (Lake Michigan) as shown in Table 4.3.2. This table also includes information on the current discharge from the Bailly Station.

TABLE 4.3-2: COMPARISON BETWEEN EXISTING AND PROPOSED WASTEWATER DISCHARGE TO LAKE MICHIGAN, AND PRELIMINARY WATER QUALITY BASED PERMIT LIMITS

| Parameter | Current Discharge (mg/l) | Proposed AFGD System Discharge (mg/l) | Preliminary Water Quality Based Permit Limits (mg/l) Average | Maximum |
|---|---|---|---|---|
| Flow, MMgpd | 220.9 | 221.1 | 220.9 | 443.2 |
| $Ca^{++}$ | 36.0 | 41.7 | N/A | N/A |
| $Mg^{++}$ | 12.3 | 15.5 | N/A | N/A |
| $SO_4^{=}$ | 23.6 | 24.6 | 176.5 | 410.7 |
| $Cl^{-}$ | 10.6 | 29.0 | 162.4 | 377.8 |
| $F^{-}$ (total) | no data | 0.9 | 1.4 | 3.3 |
| Total Dissolved Solids | no data | 150.0 | 529.5 | 1,232.0 |

Note to Table 4.3-2:

The current Bailly Station discharge includes cooling water, treated sanitary water, deicing water (cold weather only), and wastewater from the on-site ponds.

## 4.4 ECOLOGICAL IMPACTS

### 4.4.1 Construction

Construction activity related to development of the AFGD system is anticipated to have little or no impact on the area's ecological systems. The area proposed for construction is presently free of vegetation thus negating the need for clearing of potential habitat. The major impact of construction on wildlife will be that which occurs as a result of increased human activities. This impact may be observed on the less mobile species such as amphibians, reptiles and small rodents, and to a lesser degree on avian species, if present. However, it is believed that sufficient habitat exists adjacent to the construction area to permit relocation.

It is anticipated that construction activity will not increase the silt load on any surface waters. An erosion and sedimentation control plan will be developed to assure no detrimental impact on aquatic species.

### 4.4.2 Operation

As a result of the increased human activity associated with operation, it is expected that species resident, if any, may leave the area to seek new habitat. None of the species known to occur in the area has a restricted home range. Overall, there is no detrimental effect projected for the species identified in the site environs, as a result of human activity during AFGD system operation.

No state or federally listed threatened or endangered plant or animal species, or critical habitat for

such species, are present on the Bailly Station or are expected to be impacted by the proposed project within the site environs (Appendix A).

Additionally upon completion, the new stack will be appropriately marked which should minimize the effects on flying species.

The AFGD system will conform to the requirements of the NPDES permit as administered by the IDEM. This will not only assure strict effluent discharge limitations, but also monitoring requirements as set forth in Section 4.7.2. Hence, no detrimental impact on aquatic resources is projected.

## 4.5 SOCIOECONOMIC IMPACTS

### 4.5.1 Construction

An assessment of the relative impact of the construction of the AFGD system on population, employment and housing in Porter County indicates a benefit will result with respect to these attributes of the area. The construction work force for the system will consist of approximately 200 to 300 construction employees at the peak level. In terms of population changes, no significant increase is expected due to plant construction, as the area presently experiences limited construction activity on a regular basis. Also, no unusual demands for additional school or emergency medical services are anticipated.

Experience from previous projects indicates that most of the workers will commute to the job site. This suggests that a number of workers may come from within Porter County and adjacent counties. A permanent work force of 25 to 30 full-time employees will be required once the AFGD system is operational. This will contribute to an improved employment outlook in Porter County.

Construction of the AFGD system will not have any significant impact on the housing demands in the area. Only those employees who live too far from the site to commute, and those who will be permanently assigned to the site once the AFGD system is operational, will have a need initially for temporary and subsequently for permanent housing. This will constitute a relatively small percentage of employees requiring permanent residence, but will provide a positive benefit to the local economy.

#### 4.5.1.1 Transporation

Primary access to the proposed construction site will be from Highway 12 and the nearby interstate system. The anticipated increase in traffic volumes averaging from 100 to 150 vehicles per day will easily be accommodated by the existing transportation network thereby reducing potential impact as a result of vehicular congestion. Parking will be provided on-site at existing and temporary facilities. This will further minimize impact. The lack of residential and commercial enterprise in the area will further minimize impacts or disruption of activities as a result of construction activities.

E-43 #### 4.5.1.2 Noise

Increased sound levels will be generated from AFGD system construction activities and from delivery of materials to the site by truck. However, the proposed location of the site, where the majority of construction activity will occur, is such that the closest residence is approximately 8,400 feet away. At this distance, there will be a significant reduction in the levels of construction noise at the nearest residential receptor.

Present sound levels around the Bailly Station will be measured and documented. Based upon these levels and an examination of current and potential noise regulations, design sound-level criteria for the site will be established to minimize the effects of construction on present sound levels.

Adverse effects from noise produced during construction activity will be further mitigated by avoiding, to the greatest extent practical, the scheduling of on-site

construction activity during evening hours, weekends and holidays.

4.5.1.3 Visual

Visual exposure of construction activities will be obscured except during construction of the new stack.

4.5.2 Operation

The impact on population, employment and housing as a result of operation of the AFGD system will be positive for Porter County and the region surrounding the Bailly Station. Permanent employees of Pure Air will require housing, but will not place a large demand on the real estate market.

4.5.2.1 Transportation

The addition of from 110 to 120 vehicle-trips on a 24-hour basis will not impact the existing vehicular network. Parking will be easily accommodated on-site on a permanent basis.

4.5.2.2 Noise

Because of the industrial nature of the Bailly Station area and the distance to sensitive noise receptors, the net increase in area noise will be imperceptible beyond the plant boundary. Based on data from the Akoo power plant of the Kanasi Electric Company (600 MW), during normal operations, sound levels immediately adjacent to the FGD system were observed to be 111 dB(A). At the nearest residential receptor (8400 feet) the AFGD system operating at the Bailly Station, a comparable facility (528 MW), would produce a sound level of 58 dB(A). The vehicular traffic

E-30
E-32

projected in Section 4.5.2.1 would increase this level by less than 0.1 dB(A).

4.5.2.3 Visual

In all likelihood, the AFGD system will be perceived as visually blending with the other structures on-site at the Bailly Station, except for the new stack that will be required for operation of the system. The new stack height will be 480 feet or less. This is necessary to ensure a successful and environmentally sound operation. Operation of the new stack will produce a visible steam plume characteristic of FGD systems.

## 4.6 ENERGY AND MATERIALS IMPACTS

### 4.6.1 Construction

During the construction phase of the AFGD system heavy construction equipment as well as construction materials such as steel, cement and concrete will be needed. Electrical connections and other auxiliaries will be necessary. Power will be supplied from the existing Bailly Generating Station. Temporary structures and warehousing will be built to accommodate the equipment and materials necessary during construction.

### 4.6.2 Operation

Limestone and coal will be the main raw materials and gypsum will be the by-product from the AFGD system. The raw materials to be consumed and gypsum produced for this project have been estimated as follows, with the coal consumption based on current Bailly Station demand:

Estimated Annual Consumption

| | |
|---|---|
| Coal | 1,100,000 tons/yr |
| Limestone | 180,000 tons/yr |

Estimated Annual Production

| | |
|---|---|
| Gypsum | 300,000 tons/yr |

In addition, water and electricity will be required for AFGD system operation as follows:

Estimated Average Consumption

| | |
|---|---|
| Process water | 880 gallons per minute |
| Electrical usage | 7.6 MW |

Projected Emergency Consumption

| | |
|---|---|
| Fire water | 1,000 gallons per minute |
| Quenching water | 5,800 gallons per minute |

The annual estimates are based on an estimated capacity factor of 65 percent and the AFGD design coal (4.51 weight percent sulphur) data in Section 2.1.3.2, while the average and emergency estimates are based on the preliminary process design.

Limestone will be used as an absorbent. It is inexpensive and widely available: 46 of the 50 states produce limestone. Depending on market condition and availability, limestone can be acquired from one of the main limestone producers (Illinois, Ohio, Michigan or Indiana).

Lake Michigan will serve as the source for the additional water necessary for the AFGD system.

## 4.7 IMPACT SUMMARY AND MITIGATION MEASURES

### 4.7.1 Mitigation Measures

Because the AFGD system will be installed in a heavily industrialized area, no significant EHSS impacts are expected during the construction and operation of the system, other than the beneficial impact of the reduction of $SO_2$ emissions. However, the following mitigation measures will be implemented for the indicated areas to minimize potential impacts.

In addition to improved air quality, implementation of the demonstration program will create permanent employment and produce a potentially saleable by-product. More importantly, however, the successful operation of the system will substantially reduce a precursor of acid rain with a technology applicable at other locations throughout the United States.

#### 4.7.1.1 Atmospheric Mitigation

During construction, temporary access roads and laydown facilities will be treated to minimize fugitive dust emissions. No open burning will be allowed. Cleared areas will be covered with hay to minimize potential wind erosion.

The AFGD system will reduce $SO_2$ emissions to the environment during normal operations, thus enhancing air quality. When not on-line or during an upset condition, stack emissions will be redirected to the existing stack, thus avoiding an unexpected impact on ground-level concentrations. This mitigating measure will be accommodated in the system design.

Bulk loading of pulverized limestone or by-product gypsum will be done with enclosed transfer systems, minimizing fugitive emissions from these activities. Trucks transporting hydrated lime or by-product gypsum will be covered, further minimizing on-site emissions to the atmosphere.

#### 4.7.1.2 Land-Use Mitigation

During construction, the primary impact on land use will result from the occasional increase in sound levels resulting from this activity. Limiting such activity to daytime and avoiding construction on weekends and holidays, when possible, will substantially mitigate any unusual perception of increased noise levels during these periods.

The site is sufficient to absorb parking for the work force in existing and planned permanent parking areas. During operation the increase in traffic from trucks and the work force will not impact traffic flow, because of the existing capacity of the road network; therefore, no mitigation measures are planned.

Disposal of ash and other solid wastes will be in appropriately designated areas. Thus, mitigation measures are not required for this aspect of the project.

Finally, compliance with zoning requirements and the remote location of the AFGD system within a highly industrialized area will mitigate any significant impact of construction and operation of the AFGD system.

#### 4.7.1.3 Water-Quality Mitigation

Prior to actual construction, a soil erosion and sedimentation plan will be developed. It will incorporate

features such as treating open areas to avoid erosion of these areas by runoff. Any spills will be cleaned up immediately. These procedures will eliminate contaminating surface and ground water resources. Additionally, any runoff will be intercepted and diverted to the existing stormwater system. Borrow will be used for backfill and cover; construction areas will be closed and graded upon completion of construction.

The WES constitutes one of the major alternative designs for the AFGD system. Containment of some discharges is a significant means of addressing impact on both ground and surface water. If wastewater is diverted to the on-site ponds, it will be contained as the existing ponds do not discharge to the ground water. Discharges from the ponds to the lake will be controlled and monitored under an NPDES permit.

#### 4.7.1.4 Ecological Mitigation

No major impacts of construction or operation of the AFGD system are projected for the negligible ecological resources of the Bailly Station. The mitigating measures specified in Section 4.7.1.3 to protect water resources will also protect aquatic resources.

#### 4.7.1.5 Socioeconomic Mitigation

No mitigation measures are proposed for socioeconomic impacts, since no significant impacts are projected during construction and operation of the AFGD system. The AFGD system is viewed as a benefit to the area's socioeconomic setting.

#### 4.7.1.6 Energy and Materials Mitigation

The generation of electrical power is by nature consumptive of natural resources. The production of a useful by-product, gypsum, constitutes a mitigation of this overall activity from the overview perspective. A large portion of the $SO_2$ in the stack gas will be converted to a saleable product. Finally, the plant will be afforded the option of burning a widely available, economical high-sulfur coal, while lowering $SO_2$ emissions from their present levels.

### 4.7.2 Monitoring

Environmental monitoring for the AFGD project will focus on collecting on-site technical, environmental and operating data. Thus, monitoring will be primarily for environmental characterization of the process and compliance with regulatory agency conditions. Four monitoring areas will be addressed: wastewater, air, solid waste, and health and safety.

Environmental monitoring data will be collected using continuous monitoring equipment, a distributed control system, and intermittent or periodic sampling. Continuous monitoring equipment is expected to include monitors for opacity, $SO_2$, $O_2$ and slurried chloride, sulfite and carbonate concentrations. Other process data (e.g., major anions and cations) will be collected on a distributed control system with a high sampling frequency such that these data can be considered essentially continuous. Finally, some data will be collected on a set sampling schedule primarily as part of compliance monitoring to meet regulatory agency permit conditions.

#### 4.7.2.1 Wastewater Monitoring

The Bailly Generating Station has a wastewater discharge to Lake Michigan. The wastewater initially goes to a series of on-site retention ponds and then is recycled by the station on an as-needed basis. This discharge is under an NPDES permit and covers the main outfall and intake discharges (Appendix C).

The proposed AFGD system will demonstrate the potential for reducing liquid waste from any portion of the process. If the proposed WES is not used as currently planned, then wastewater from the AFGD system will be discharged into an on-site pond. Additional wastewater discharges resulting from the AFGD system may include sanitary wastes and stormwater runoff. These additional discharges will be handled by existing facilities.

No additional wastewater monitoring will be required as a result of the AFGD system, since no new outfall points are proposed. The current wastewater outfall monitoring will be maintained as required by the IDEM, Office of Water Management (OWM). The water quality information required by the OWM may include chlorides, pH and TSS, as required for the existing outfall.

#### 4.7.2.2 Air Monitoring

The Bailly Station currently measures plume opacity from the existing stack. Biennial stack tests are also conducted to measure $SO_2$ and particulate matter emission rates. The current IDEM, Office of Air Management (OAM) permit allows for an emission level of 6.0 lbs/MMBtu for $SO_2$, 0.22 lbs/MMBtu for particulate matter and an opacity limit not to exceed 40 percent (Appendix C).

Northern Indiana also conducts ambient air monitoring as part of the Porter County $SO_2$ Monitoring Network. Northern Indiana collects $SO_2$ data from three monitoring sites, two of which also collect meteorological data. The proposed AFGD system should not introduce any additional air pollutants into the Bailly Station area; in fact, this system is designed to reduce $SO_2$ emissions by 90 percent or greater.

An existing air monitoring network can be used to determine the impacts of the AFGD system. Source tests for $SO_2$ and particulates will be conducted and plume opacity will be checked so that all air emissions are within the established air permit conditions. A continuous opacity monitor will be installed after the electrostatic precipitator.

As part of the AFGD system, continuous chemical process control monitors are expected to be installed. These instruments will continuously monitor chloride, $SO_3$ and $CO_3$ concentrations.

4.7.2.3 Solid-Waste Monitoring

The Bailly Station currently uses an electrostatic precipitator to control particulate emissions and fly ash. The fly ash and furnace bottom ash are the two solid-waste streams produced by the station's boilers. These waste streams are exempt from the Resource Conservation and Recovery Act Subtitle C Hazardous Waste Regualtions by 40 CFR Part 261.4 (b)(4). They are also exempted from Indiana solid-waste regulations as long as they are used for approved beneficial purposes. If they are not, these materials must be disposed in an appropriate landfill. Currently the Bailly Station ash is marketed through a broker for resale or for

other uses. The remaining ash is disposed of in an out-of-state landfill.

Coal and limestone samples representative of those feed stocks to be used during the AFGD demonstration phase will be processed in a test unit to produce by-product gypsum. This representative material will be characterized by EP toxicity tests and analyzed for chlorides.

#### 4.7.2.4 Health and Safety Consideration of Monitoring Requirements

The current procedures and monitoring requirements for health and safety at the Bailly Station will be continued with the installation of the AFGD system. This new system will result in additional noise at the plant and also produce (non-hazardous) gypsum.

A background sound survey will be conducted prior to AFGD system construction. Once the system is operational, additional sound-level studies can be conducted to verify the design basis to mitigate increases in noise levels.

## 4.8 REFERENCE

1. Boynton, Robert S. Chemistry and Technology of Lime and Limestone. New York, New York: John Wiley & Sons, Inc., 1967.

# 5.0 REGULATORY COMPLIANCE

## 5.1 REGULATIONS AND PERMIT REQUIREMENTS

### 5.1.1 Regulations

The environmental regulations with which the AFGD system must comply are those governing air quality and emissions, water quality and discharges, and solid and hazardous wastes with which the Bailly Generating Station must also comply. The U.S. Environmental Protection Agency (EPA) has delegated authority to implement these regulations to the appropriate offices within the Indiana Department of Environmental Management (IDEM). Existing health and safety regulations directed at employees will continue to be implemented.

#### 5.1.1.1 Air Regulations

In Indiana the IDEM, Office of Air Management (OAM) is responsible for enforcement of the state's Air Pollution Control Law and existing regulations. The air regulations governing the existing Bailly Generating Station will also govern the proposed AFGD system. The installation of the AFGD system is not in response to any regulatory requirements. The IDEM, OAM has indicated that the AFGD system does not fall under Prevention of Significant Deterioration (PSD) regulations. The OAM will require a Permit to Construct application. As part of this application the OAM will issue a Technical Support Document (TSD). The TSD will contain a proposed air emission permit with emission limitations and conditions. The IDEM, OAM will also set maximum limits on various parameters ($SO_2$, particulates, opacity) to protect air quality and determine compliance.

Stack tests to verify actual emissions will be required and a Permit to Operate will be issued.

5.1.1.2 Wastewater Regulations

The Indiana Water Pollution Control Law and associated regulations are enforced by IDEM, Office of Water Management (OWM). Surface water discharges are authorized by these regulations under the NPDES program.

The existing Bailly Station NPDES permit requires that any anticipated facility process modifications that result in new, different or increased wastewater discharges must be reported. Therefore, a new NPDES permit application with some modifications to the current NPDES permit for discharge of additional wastewater may be required. The only waste stream from the AFGD process is the high-chloride wastewater from the gypsum cake washing cycle. The proposed AFGD system is designed to evaporate some of the wastewater produced in the gypsum dewatering and cake washing cycle.

5.1.1.3 Solid-Waste Regulations

Authorization for disposal of solid and hazardous wastes in Indiana is governed by the Solid Waste Management Law and Permit Regulations, and the Hazardous Waste Management Regulations. These regulations are implemented by the IDEM, Office of Solid and Hazardous Waste Management (OSHWM).

The solid waste or by-products that would be generated by the AFGD system are ash and gypsum. Currently the Bailly Generating Station's ash is sold to a broker for resale, for other uses or for disposal out-of-state. The gypsum produced as a by-product will be a stable compound (no pre-treatment or stabilization required). It is a saleable

by-product, and is a suitable raw material for wallboard manufacturing. There is the potential for producing some quantity of gypsum that would not meet the wallboard manufacturer's specification. In the event that this gypsum could not be sold, it would be landfilled. Coal and limestone samples representative of those feed stocks to be used during the AFGD system demonstration phase will be processed in a test unit to produce by-product gypsum. This representative material will be characterized by EP toxicity tests and analyzed for chlorides. Pure Air will conduct the testing necessary to receive approval from the IDEM for disposing of the gypsum prior to AFGD system start-up.

### 5.1.2 Permit Requirements

Permit requirements for the AFGD system are described below based on contact with the appropriate regulatory agencies. Relevant excerpts from these contacts are included in Appendix D. Permits for the AFGD system are expected to be obtained between April 1989 and August 1992. E-63

The Bailly Generating Station currently has permits or approvals for air emissions, water discharges and the existing stack. The station does not require a solid waste disposal permit since the coal ash is exempt from regulatory control and the ash and other waste materials are removed from the site by a contract hauler for disposal or reuse. The station also has an EPA Identification Number as a generator of routine power-plant hazardous wastes. It is expected that Pure Air will obtain another EPA Identification Number for construction and operation of the AFGD system (see Table 5.1-1).

The station's Permit to Operate for air emissions is issued by the IDEM, OAM. The permit has the following emission conditions for each of the two coal-fired boilers:

TABLE 5.1-1: ANTICIPATED PERMITS/APPROVALS AND RESPONSIBLE AGENCIES

| Permit/Approval | Responsible Agency |
|---|---|
| **Federal** | |
| Notice of Proposed Construction or Alteration<br>Proposed Approval Date: April 1989 | Federal Aviation Administration |
| Identification Number for Hazardous Waste Activity<br>Proposed Approval Date: March 1990 | U.S. Environmental Protection Agency |
| **State** | |
| Permit to Construct/Permit to Operate<br>Proposed Approval Date: March 1990 (Permit to Construct); August 1992 (Permit to Operate) | Indiana Department of Environmental Management (IDEM), Office of Air Management |
| Solid Waste Disposal Approval (Ash, Gypsum)<br>Proposed Approval Date: March 1990 | IDEM, Office of Solid and Hazardous Waste Management |
| National Pollutant Discharge Elimination System Permit Modification/Approval<br>Proposed Approval Date: March 1990 | IDEM, Office of Water Management |
| Foundation Release/Construction Design Release/Fire Suppression System<br>Proposed Approval Date: Engineering Approvals to be obtained as design proceeds from August 1990 to March 1992 | Indiana Department of Fire and Building Services |
| **Local** | |
| Improvement Location Permit<br>Proposed Approval Date: March 1990 | Porter County Plan Commission |

| Parameter | Emission Level |
|---|---|
| $SO_2$ | 6.0 lbs/MMBtu |
| Particulate Matter | 0.22 lbs/MMBtu |
| Opacity | 40 percent |

In addition to the above boiler emission requirements, the station's fugitive dust emissions shall comply with the Indiana Air-Pollution Control Law.

The AFGD system will require obtaining new Permits to Construct and Operate from the IDEM, OAM.

Wastewater discharges from the Bailly Generating Station are authorized under the NPDES program administered by the IDEM, OWM. The NPDES permit specifies effluent limitations for within station discharge points and the overall discharge shown in Table 5.1-2. In addition to the requirements shown in Table 5.1-2, the discharges shall not result in foaming at the main outfall or contain oil or other substances in amounts sufficient to create a visible film or sheen on the receiving waters.

The existing NPDES permit requires that any anticipated facility process modifications that result in new, different or increased wastewater discharges must be reported. Thus, a new NPDES permit application may be submitted to the IDEM, OWM for either the combined Bailly Generating Station and AFGD system wastewater, or only for the latter discharge, if any. E-26

The Bailly Generating Station also currently has Federal Aviation Administration (FAA) approval for the existing stack. The FAA will provide approvals for the AFGD system's new stack and operation of construction cranes.

TABLE 5.1-2: EXISTING BAILLY GENERATING STATION NPDES PERMIT EFFLUENT LIMITATIONS

| Discharge Point or Outfall | Parameter | Quality or Concentration Monthly Average | Daily Maximum | Units |
|---|---|---|---|---|
| 001-Main Outfall | Flow | Report | Report | |
| | Temperature | Report | Report | $^{o}F$ |
| 002-Intake Deicing | Total Residual Chlorine | - | 0.2 | mg/1 |
| **Within Station Discharges** | | | | |
| 100-Miscellaneous Low Volume Bypass | Flow | - | - | |
| | TSS | 30 | 100 | mg/1 |
| | Oil & Grease | 15 | 20 | mg/1 |
| | pH | 6.0-9.0 | | units |
| 101-Ash Pond | Flow | - | - | |
| | TSS | 20 | 30 | mg/1 |
| | Oil & Grease | 15 | 20 | mg/1 |
| | pH | 6.0-9.0 | | units |
| 111-Metal Cleaning Waste | Flow | - | - | |
| | Total Iron | - | 1.0 | mg/1 |
| | Total Copper | - | 1.0 | mg/1 |
| 201-Sewage Treatment Plant | Flow | - | - | |
| | $BOD_5$ | 30 | 45 | mg/1 |
| | Fecal Coliform | - | 400 | 100 ml |
| | Total Residual Chlorine | - | 2.0 | mg/1 |
| 301-Boiler Blowdown | Flow | - | - | |
| | TSS | 30 | 100 | mg/1 |
| | Oil & Grease | 15 | 20 | mg/1 |
| | pH | 6.0-9.0 | | units |
| 003-Coal Pile Runoff | Flow | - | - | |
| | pH | 6.0-9.0 | | units |

## 5.2 ANTICIPATED PERMITS/APPROVALS

As indicated previously, the AFGD system will require permits/approvals from both federal and state agencies. In addition to those discussed in relation to the existing Bailly Generating Station permits, the AFGD system will require various construction releases from the state and Porter County. The anticipated permits/approvals for the AFGD system are shown in Table 5.1-1 and described below.

### 5.2.1 Air Emission Permits/Approvals

Discussions with the IDEM, OAM indicate that the modified air emissions will be permitted separately from the Bailly Generating Station air emissions. This will require that Pure Air obtain a Permit to Construct prior to initiating construction activities. It is expected that the permit conditions will specify compliance with limits for at least the same parameters that are in the existing station Operating Permit (i.e., $SO_2$, particulate matter, opacity).

The air emission limits will be based on modeling the new stack's physical parameters. Once the AFGD system is in operation, source testing will be conducted to determine actual stack emissions. An Operating Permit will then be issued by the IDEM, OAM. The Operation Permit also will specify compliance with the Indiana Air-Pollution Control Law for fugitive dust emissions.

### 5.2.2 Solid-Waste Disposal Permits/Approvals

The AFGD system will have solid wastes associated with both construction and operation. Non-hazardous wastes from construction do not require approval for disposal and will be disposed in an environmentally acceptable manner. Construction wastes that are deemed hazardous (e.g.,

miscellaneous solvents/paints/cleaners; waste oil, and acid and caustic aqueous solutions) will be removed from the site and disposed by an approved contract hauler in an approved site/facility. At the AFGD system site these hazardous waste activities will be under an EPA Identification Number. Similar wastes, if any, generated during operation also will be disposed under this Identification Number.

AFGD system operational wastes or by-products will consist primarily of coal ash and gypsum. These wastes may be removed from the site by a contract hauler for disposal or sale for other uses. Under these circumstances the contract hauler may be responsible for obtaining any necessary permits/approvals, in particular if the wastes or by-products are taken out of Indiana. However, the AFGD system project may be required to obtain approval for disposing of operational wastes if they are not used for beneficial use. This approval will be obtained from IDEM, OSHWM if waste disposal is in Indiana.

E-26 5.2.3 Wastewater Discharge Permits/Approvals

The AFGD system will have sanitary and possibly process-related wastewater discharges. Initially a letter describing these discharges will be sent to the IDEM, OWM. If the latter views the discharges as being insignificant with respect to existing Bailly Generating Station wastewater discharges, the IDEM, OWM will issue a letter approval for the AFGD system wastewater discharges. If the additional wastewater discharges from the AFGD system are viewed by the IDEM, OWM as having a significant impact on the existing wastewater discharge system, or there are additional point discharges, a new NPDES permit will be required.

If a new NPDES permit is required, the IDEM, OWM has indicated that parameters similar to those in the Bailly

Station's existing permit would be monitored. However, additional parameters may be monitored depending on the discharges and their constituents.

### 5.2.4 Other Permits/Approvals

In addition to the cited permits/approvals for air emissions, solid-waste disposal and wastewater discharges, the project will be required to obtain construction or engineering design permits/approvals. As shown in Table 5.1-1 and discussed below, these will be obtained from federal, state and local agencies.

A federal approval from the FAA will be obtained for construction of the new AFGD system stack (Notice of Proposed Construction or Alteration). This approval also involves obtaining approval for the cranes to be used during construction of the AFGD system.

The Indiana Department of Fire and Building Services (DFB) is responsible for enforcing building codes and fire safety regulations. In order to accomplish this the DFB will require that the AFGD project submit design information for plan review. The design information submitted will include information on electrical, plumbing and mechanical systems, and compliance with the Indiana Energy Conservation Code. Once the review is complete, building permits will be issued such as a foundation release, construction design release and fire suppression system approval.

The state of Indiana does not have a Coastal Zone Management Act Plan. However, projects along the lake may be subject to environmental review by the IDEM if the construction will have an adverse effect on endangered wildlife or plant life. If the construction is located in a

flood plain or requires dredging or filling of a waterway the project will be subject to review by the Department of Natural Resources (DNR) Water Division. Since the AFGD system project will neither impact the flood plain, nor be built on the lakeshore, and wetlands are not present, Pure Air does not anticipate involvement of the DNR.

The only anticipated local approval for the AFGD project will be issued by the Porter County Plan Commission. This will involve issuance of an Improvement Location Permit and Certificate of Occupancy. This approval involves submitting a site plan for the project and information on drainage control from the site. It will also involve coordinating construction inspections with the county and state building inspectors.

## 6.0 AUTHORS AND THEIR QUALIFICATIONS

### 6.1 AIR PRODUCTS AND CHEMICALS, INC.

Kunz, Robert G., B.Ch.E., M.S., Ph.D., P.E.

Dr. Kunz, a Chemical and Environmental Engineer, is the Manager of Environmental Engineering Design for Air Products and Chemicals, Inc. Process System Group. He has over 20 years of industrial experience in chemical and refinery technology, process engineering, and environmental assessment, control and permitting. He has contributed to the published literature in the areas of environmental control and water and wastewater treatment, and is a recipient of the Harrison Prescott Eddy Medal from the Water Pollution Control Federation.

### 6.2 ENVIROPLAN, INC.

Haque, Obaidul, B.S., M.S.

Mr. Haque, a Chemical Engineer, served as a Project Engineer for preparation of the Environmental Information Volume. He has extensive experience in environmental studies estimating air pollution emissions for different chemical, petroleum, and manufacturing plants. He is also experienced in community exposure, risk assessment, and air quality modeling for various industrial clients.

Huston, J. Spenser, B.S., M.S.

Mr. Huston served as Project Manager for preparation of the Environmental Information Volume (EIV). He has over 20 years experience in environmental assessment

and reporting in support of capital development varying from $250,000 to over $1 billion. These activities include nuclear-fueled power plants, petrochemical plants and synfuel facility development under DOE auspices. Mr. Huston is a Certified Consulting Meteorologist (296).

Kowalsky, Laura, B.A.

Ms. Kowalsky, Project Investigator for the EIV, writes marketing brochures and proposals, and has written, edited and produced many of Enviroplan's publications, proposals and reports. She has been a journalist and technical editor/writer specializing in environmental subjects.

Lackaye, Robert W., B.S.

Mr. Lackaye served as Project Scientist in the preparation of the Environmental Information Volume. He has extensive experience conducting air pollutant sampling and analysis projects. His project experience has included source testing utilizing EPA Methods, fugitive emission studies, ambient air monitoring and industrial hygiene studies for various pollutants. Mr. Lackaye has conducted air sampling projects to determine compliance with Federal, state and local air pollution regulations, and also to assess environmental quality.

Simpson, Estelle B., B.S.

Ms. Simpson, a Chemical Engineer, is a Project Engineer for preparation of the EIV. She has extensive experience in environmental studies of hazardous emissions from industrial facilities. These studies include comprehensive emission studies, community exposure, accidental releases, and risk assessment. She is also

involved in air-quality modeling of hazardous pollutants for various chemical clients.

6.3 NORTHERN INDIANA PUBLIC SERVICE CO.

Ross, John M., B.A., M.B.A.

Mr. Ross is the Superintendent of Environmental Planning in Northern Indiana's Environmental Programs Department. He acted as Northern Indiana's project coordinator for the preparation of the EIV. During the past 11 years, Mr. Ross has held various environmental positions at Northern Indiana to include ambient air monitoring system design and operation, estimation of air pollution emissions, performance and review of EPA source tests; application and operation of continuous emissions monitors. Mr. Ross has also been involved in the analysis of environmental regulation and policy to the extent that it impacts on Northern Indiana operations.

6.4 PURE AIR

Bolinsky, Francis T., B.S.

Mr. Bolinsky, a Chemical Engineer, is the Senior Project Manager for Pure Air. He has over 18 years of experience in industrial plants and has been extensively involved in permitting in many states.

6.5 STEARNS-ROGER DIVISION OF UNITED ENGINEERS & CONSTRUCTORS INC.

Dennis, D. Steve, B.S., M.S., Ph.D.

Dr. Dennis, an Environmental Engineer, coordinated the overall development of the Environmental Information

Volume. He has over 19 years experience with environmental studies and over 12 years experience with permitting industrial projects. These projects have included coal, copper, uranium and precious metal mines; natural gas processing facilities; coal liquefaction and pyrolization; underground coal gasification and potash solution mining; uranium processing from phosphoric acid; coal-fired generating facilities; crude oil pipelines; low density polyethylene plant; oil shale processing; $CO_2$ enhanced oil recovery; coastal spaceport facility, and an ammonium perchlorate plant.

Brown, Gary D., B.S.

Mr. Brown, a Chemical Engineer, served as a Process Engineer for preparation of the EIV. He has extensive experience in technical feasibility and economic studies of $SO_2$ control processes for the Electric Power Research Institute (EPRI) and private utilities. Mr. Brown is a Registered Professional Engineer in Colorado (Registration No. 20713) and is a process engineer in the Power Division of Stearns-Roger.

Ireland, Paul A., B.S.

*Mr. Ireland was responsible for several* project/process related sections of the EIV. He has 20 years experience in the flue gas desulfurization (FGD) industry, has served as lead process engineer for two major FGD projects (600 MW and 1,000 MW) and has traveled throughout the U.S., Japan and Europe visiting FGD installations.

# APPENDIX A

## INFORMATION LETTER FROM INDIANA DEPARTMENT OF NATURAL RESOURCES

## AND

## INFORMATION ON ENDANGERED, THREATENED AND RARE PLANTS AND ANIMALS FOUND IN THE INDIANA DUNES NATIONAL LAKESHORE, PORTER COUNTY (STATE OF INDIANA AND FEDERALLY LISTED SPECIES)

E-59

INDIANA DEPARTMENT OF NATURAL RESOURCES

Patrick R. Ralston, Director

**Division of Nature Preserves**
**605B State Office Building**
**Indianapolis, Indiana 46204-2267**
**317-232-4052**

April 5, 1989

Laura Kowalsky
Enviroplan
59 Main Street
West Orange, NJ 07052

Dear Ms. Kowalsky:

In response to your request of March 30, 1989, I will address each question individually.

Migratory patterns and nesting information on the bald eagle in relation to the Bailly Site: E-40

Historically, bald eagles (Haliaeetus leucocephalus) nested along the shore of Lake Michigan in Indiana. In 1898, Amos Butler reported that bald eagles "bred quite commonly" in Lake County and there were numerous reports of nesting near the lakeshore. In recent years, however, we have seen no indication of nesting along the lakeshore. Certainly, based on your description of the Bailly Site, no bald eagles nest within it. However, eagles are often seen in the area. Bald eagles have been reported annually since 1978 in the area and are most often seen near the lakeshore. These birds are not local nesters.

Any federally or state endangered, threatened, or protected wildlife within the confines of the Bailly Station: E-38

I have checked the Indiana Natural Heritage Program's database. This is the most comprehensive database of endangered, threatened, and rare wildlife in the state. We are unaware of the existence of any federally or state endangered, threatened, or rare species within the boundaries of the Bailly Generating Station. Given the site description as per our phone conversation, there doesn't appear to be suitable habitat.

Does transient migration of land vertebrates occur in the area: E-39

Because of the site's proximity to Lake Michigan and the Indiana Dunes National Lakeshore, it is probable that land vertebrates travel into or across the site. However, no data are available to confirm that species do or do not use the site in their normal movements.

Information on the migratory patterns of birds in the National Lakeshore:

The Department of Natural Resources has no compiled information on the migratory patterns of birds in the Lakeshore area. This information may be found in "Birds of the Indiana Dunes" by Kenneth J. Brock published by the Indiana University Press in Bloomington, Indiana in 1986. According to Brock, thousands of migrating birds navigating to wintering grounds in the autumn are funneled along the shores of Lake Michigan into the Dunes area at the toe of the lake. During spring flights, migrating hawks are concentrated in a belt immediately adjacent to the lake. It is important to note that, during the fall raptor movements, the federally endangered peregrine falcon (Falco peregrinus) is often seen flying along the beaches.

Please contact me if I can be of further assistance.

Sincerely,

Michelle L. Martin
Indiana Natural Heritage Program

cc: Scott Johnson, Division of Fish and Wildlife
Noel Pavlovic, Indiana Dunes National Lakeshore

TABLE A-1: ENDANGERED, THREATENED AND RARE PLANTS FOUND IN THE INDIANA DUNES NATIONAL LAKESHORE, PORTER COUNTY (STATE OF INDIANA LIST)

Key: E = Endangered T = Threatened R = Rare

| SPECIES NAME | SPECIES COMMON NAME | STATUS |
|---|---|---|
| Actaea Rubra | Red Baneberry | T |
| Amelanchier Humilis | Running Serviceberry | T |
| Andromeda Glaucophylla | Bog Rosemary | T |
| Arabis Glabra | Tower-Mustard | T |
| Aralia Hispida | Bristly Sarsaparilla | E |
| Arctostaphylos Uva-Ursi | Bearberry | R |
| Arenaria Stricta | Stiff Sandwort | T |
| Aristida Intermedia | Slim-Spike Three-Awn Grass | T |
| Aristida Tuberculosa | Seabeach Needlegrass | T |
| Aster Furcatus | Forked Aster | E |
| Aster Junciformis | Rush Aster | R |
| Aster Sericeus | Eastern Silvery Aster | R |
| Baptisia Tinctoria | Yellow Wild-Indigo | R |
| Betula Papyrifera | Paper Birch | R |
| Botrychium Matricariifolium | Matricary Grape-Fern | E |
| Botrychium Simplex | Least Grape-Fern | E |
| Buchnera Americana | Bluehearts | E |
| Cakile Edentula Var Lacustris | American Sea-Rocket | T |
| Calla Palustris | Wild Calla | E |
| Carex Alata | Broadwing Sedge | R |
| Carex Aurea | Goldenfruit Sedge | T |
| Carex Chordorrhiza | Creeping Sedge | E |
| Carex Debilis Var Rudgei | Sedge | T |
| Carex Eburnea | Ebony Sedge | T |
| Carex Flava | Yellow Sedge | E |
| Carex Folliculata | Long Sedge | E |
| Carex Garberi | Elk Sedge | E |
| Carex Leptonervia | Finely-Nerved Sedge | E |
| Carex Limosa | Mud Sedge | E |
| Carex Pedunculata | Longstalk Sedge | T |
| Carex Seorsa | Weak Stellate Sedge | T |
| Carex Woodii | Pretty Sedge | T |
| Caralpa Speciosa | Northern Catalpa | R |
| Chimaphila Umbellata Var Cisatlantica | Common Wintergreen | T |
| Chrysosplenium Americanum | American Golden-Saxifrage | E |
| Cirsium Pitcheri | Dune Thistle | T |
| Coeloglossum Viride Var Virescens | Bracted Orchid | T |
| Cornus Canadensis | Bunchberry | E |
| Cornus Rugosa | Roundleaf Dogwood | T |

TABLE A-1: (Continued)

| SPECIES NAME | SPECIES COMMON NAME | STATUS |
|---|---|---|
| Cypripedium Candidum | Small White Lady's-Slipper | R |
| Diervilla Lonicera | Bush Honeysuckle | R |
| Drosera Intermedia | Spoon-Leaved Sundew | R |
| Eleocharis Geniculata | Capitate Spike-Rush | E |
| Eleocharis Melanocarpa | Black-Fruited Spike-Rush | E |
| Eleocharis Pauciflora | Fewflower Spikerush | R |
| Epigaea Repens | Trailing Arbutus | R |
| Eriophorum Angustifolium | Narrow-Leaved Cotton-Grass | T |
| Euphorbia Polygonifolia | Seaside Spurge | T |
| Gentiana Alba | Yellow Gentian | E |
| Gentiana Puberulenta | Downy Gentian | T |
| Geranium Bicknellii | Bicknell Northern Crane's-Bill | E |
| Hudsonia Tomentosa | Sand-Heather | T |
| Isotria Verticillata | Large Whorled Pogonia | T |
| Juncus Pelocarpus | Brown-Fruited Rush | T |
| Juniperus Communis | Ground Juniper | R |
| Lathyrus Venosus | Smooth Veiny Pea | R |
| Liatris Pycnostachya | Cattail Gay-Feather | E |
| Ludwigia Sphaerocarpa | Globe-Fruited False-Loosestrife | E |
| Lycopodium Clavatum | Running Pine | T |
| Lycopodium Inundatum | Northern Bog Clubmoss | E |
| Lycopodium Obscurum | Tree Clubmoss | T |
| Lycopodium Tristachyum | Deep-Root Clubmoss | E |
| Malaxis Unifolia | Green Adder's-Mouth | E |
| Melampyrum Lineare | American Cow-Wheat | T |
| Milium Effusum | Tall Millet-Grass | T |
| Myosotis Laxa | Smaller Forget-Me-Not | E |
| Myriophyllum Verticillatum | Whorled Water-Milfoil | T |
| Nemopanthus Mucronatus | Mountain Holly | R |
| Oenothera Perennis | Small Sundrops | R |
| Oryzopsis Asperifolia | White-Grained Mountain-Ricegrass | E |
| Pryzopsis Racemosa | Black-Fruit Mountain-Ricegrass | E |
| Panax Trifolius | Dwarf Ginseng | R |
| Panicum Boreale | Northern Panic Grass | R |
| Panicum Leibergii | Leiberg's Witchgrass | E |
| Panicum Verrucosum | Warty Panic Grass | E |
| Pinus Banksiana | Jack Pine | R |
| Platanthera Ciliaris | Yellow-Fringe Orchis | E |
| Platanthera Clavellata | Small Green Woodland Orchis | R |
| Platanthera Flava Var Herbiola | Northern Rein-Orchid | R |
| Platanthera Hyperborea | Leafy Northern Green Orchis | T |
| Platanthera Psycodes | Small Purple-Fringe Orchis | R |

TABLE A-1: (Continued)

| SPECIES NAME | SPECIES COMMON NAME | STATUS |
|---|---|---|
| Poa Alsodes | Grove Meadow Grass | T |
| Poa Paludigena | Bog Bluegrass | T |
| Pogonia Ophioglossoides | Rose Pogonia | R |
| Polygala Paucifolia | Gay-Wing Milkwort | E |
| Polygonella Articulata | Eastern Jointweed | T |
| Polygonum Opelousanum Var Adenocalyx | Smartweed | T |
| Potamogeton Pusillus | Slender Pondweed | R |
| Potamogeton Richardsonii | Redheadgrass | E |
| Potamogeton Robbinsii | Flatleaf Pondweed | E |
| Potentilla Anserina | Silverweed | E |
| Prunus Pensylvanica | Fire Cherry | R |
| Psilocarya Scirpoides | Long-Beaked Baldrush | T |
| Pyrola Elliptica | Elliptical-Leaf Wintergreen | R |
| Pyrola Rotundifolia Var Americana | American Wintergreen | R |
| Rhus Trilobata Var Arenaria | Beach Sumac | T |
| Rhynchospora Globularis Var Recognita | Globe Beaked-Rush | E |
| Rhynchospora Macrostachya | Tall Beaked-Rush | R |
| Ribes Hirtellum | Smooth Gooseberry | R |
| Rubus Odoratus | Purple Flowering Raspberry | T |
| Salix Cordata | Heartleaf Willow | T |
| Scirpus Hallii | Hall's Bullrush | E |
| Scirpus Smithii | Weakstalk Bullrush | R |
| Scleria Pauciflora | Fewflower Nutrush | E |
| Scleria Reticularis | Netted Nutrush | E |
| Selaginella Rupestris | Ledge Spike-Moss | T |
| Solidago Deamii | Deam Goldenrod | E |
| Solidago Spathulata Var Gillmanii | Sticky Goldenrod | T |
| Sparganium Androcladum | Branching Bur-Reed | E |
| Stipa Avenacea | Blackseed Needlegrass | E |
| Talinum Rugospermum | Prairie Fame-Flower | E |
| Thuja Occidentalis | Arbor-Vitae | E |
| Utricularia Cornuta | Horned Bladderwort | T |
| Utricularia Geminiscapa | Hidden-Fruited Bladderwort | E |
| Utricularia Purpurea | Purple Bladderwort | R |
| Vaccinium Oxycoccos | Small Cranberry | T |
| Veronica Glandifera | Speedwell | R |
| Wisteria Macrostachya | Kentucky Wisteria | E |
| Woodwardia Areolata | Netted Chainfern | E |
| Xyris Caroliniana | Carolina Yellow-Eyed Grass | T |

Source: Indiana Department of Natural Resources, Division of Nature Preserves (Indiana Natural Heritage Program), Indianapolis, IN. Personal communication: January 1989.

TABLE A-2: ENDANGERED, THREATENED AND RARE ANIMALS FOUND IN THE INDIANA DUNES NATIONAL LAKESHORE, PORTER COUNTY (STATE OF INDIANA LIST)

Key: E = Endangered T = Threatened SC = Special Concern
WL = Watch List 00 = Status Under Review

| SPECIES NAME | SPECIES COMMON NAME | STATUS |
|---|---|---|
| **Amphibians** | | |
| Ambystoma Laterale | Blue-Spotted Salamander | SC |
| Hemidactylium Scutatum | Four-Toed Salamander | T |
| Pseudacris Triseriata | Striped Chorus Frog | SC |
| Rana Pipiens | Northern Leopard Frog | SC |
| **Reptiles** | | |
| Clemmys Guttata | Spotted Turtle | T |
| Emydoidea Blandingii | Blanding's Turtle | SC |
| Opheodrys Vernalis Blanchardi | Western Smooth Green Snake | T |
| Ophisaurus Attenuatus Attenuatus | Western Slender Grass Lizard | 00 |
| Sistrurus Catenatus Catenatus | Eastern Massasauga | T |
| Thamnophis Proximus | Western Ribbon Snake | SC |
| **Birds** | | |
| Ardea Herodias | Great Blue Heron | WL |
| Botaurus Lentiginosus | American Bittern | E |
| Buteo Lineatus | Red-Shouldered Hawk | SC |
| Dendroica Cerulea | Cerulean Warbler | 00 |
| Dendroica Pensylvanica | Chestnut-Sided Warbler | 00 |
| Ixobrychus Exilis | Least Bittern | SC |
| Lanius Ludovicianus | Loggerhead Shrike | E |
| Mniotilta Varia | Black-and-White Warbler | SC |
| Nycticorax Nycticorax | Black-Crowned Night-Heron | E |
| Rallus Elegans | King Rail | E |
| Vermivora Chrysoptera | Golden-Winged Warbler | E |
| Wilsonia Canadensis | Canada Warbler | SC |
| Wilsonia Citrina | Hooded Warbler | SC |
| **Mammals** | | |
| Spermophilus Franklinii | Franklin's Ground Squirrel | SC |

TABLE A-2: (Continued)

| SPECIES NAME | SPECIES COMMON NAME | STATUS |
|---|---|---|
| Insects | | |
| Euchloe Olympia | Olympia Marblewing | T |
| Lycaeides Melissa Samuelis | Karner Blue Butterfly | E |

Source: Indiana Department of Natural Resources, Division of Nature Preserves (Indiana Natural Heritage Program), Indianapolis, IN. Personal communication: January 1989.

TABLE A-3: 1989 FEDERALLY THREATENED AND ENDANGERED FLORA AND FAUNA FOUND IN THE INDIANA DUNES NATIONAL LAKESHORE

Key: E = Endangered T = Threatened

| SPECIES NAME | COMMON NAME | STATUS |
|---|---|---|
| Cirsium Pitcheri | Dune Thistle | T |
| Dendroica Kirtlandii | Kirtland's Warbler | T |
| Falco Peregrinus | Peregrine Falcon | E |
| Haliaeetus Leucocephalus | Bald Eagle (migrant) | E |
| Myotis Sodalis | Indiana Bat | E |
| Myotis Grisescens | Gray Bat | E |

Source: Indiana Dunes National Lakeshore; National Park Service - Resource Management Division. Personal communication: January 1989.

# APPENDIX B

## ARCHAEOLOGICAL AND HISTORICAL SURVEYS

## AND

## INFORMATION LETTER FROM INDIANA DEPARTMENT OF NATURAL RESOURCES

In a letter dated September 25, 1970 the Advisory Council on Historic Preservation stated that "no National Register properties have been identified within the immediate vicinity" of the Bailly Station. This letter was sent to a regulatory agency in response to previously proposed construction at the Bailly Station. In this Appendix is a copy of a letter dated March 29, 1989 from the Indiana Department of Natural Resources, Division of Historic Preservation and Archaeology stating that no site now in or eligible for inclusion in the National Register of Historic Places will be affected by construction of the AFGD system. According to the National Register, the closest historic site to the Bailly Station is the Joseph Bailly Homestead and Cemetery as stated in Section 3.5.3.3, Historic Sites and Natural Landmarks located within two miles of the Bailly Station. There have been no additions to the National Register in the Bailly vicinity between 1970 and present. However, the South Shore Station at Beverly Shores has been nominated to the National Register. The South Shore Station is approximately 10 miles from the Bailly Station. E-64

INDIANA DEPARTMENT OF NATURAL RESOURCES
Division of Historic Preservation
and Archaeology
251 East Ohio Street, Suite 880
Indianapolis, Indiana 46204

PATRICK R. RALSTON, DIRECTOR

March 29, 1989

Laura Kowalsky
Marketing Services Manager
Enviroplan
59 Main Street
West Orange, New Jersey 07052

Dear Ms. Kowalsky:

E-64 We have reviewed the proposed construction of an advanced flue gas desulfurization (AFGD) system at the Northern Indiana Public Service Company's Bailly Generating Station located in Porter County, Indiana.

No known historical, architectural, or archaeological sites listed on or eligible for inclusion in the National Register of Historic Places will be affected by this project. If any archaeological artifacts are uncovered during construction, work will stop and the discovery will be reported to our Division of Historic Preservation and Archaeology.

We appreciate the opportunity to be of service.

Very truly yours,

Patrick R. Ralston
State Historic Preservation Officer

PRR:SBG:vk

# APPENDIX C

## BAILLY GENERATING STATION WAIVER FROM GROUND WATER MONITORING REQUIREMENTS, AND PERMITS FOR WASTEWATER DISCHARGES AND AIR EMISSIONS

# WAIVER FROM GROUND WATER MONITORING REQUIREMENTS

STATE OF INDIANA

ENVIRONMENTAL MANAGEMENT BOARD

INDIANAPOLIS 46206-1964

1330 West Michigan Street
P. O. Box 1964

December 8, 1983

Mr. C. W. Kern, Manager
Environmental Affairs
Northern Indiana Public
Service Company
5265 Hohman Avenue
Hammond, IN 46320

Dear Mr. Kern:

Re: Waiver Demonstration Bailly Generating Station, Porter County
IND 000718114

This letter will serve as a Notice of Waiver from the ground water monitoring requirements as set forth under 40 CFR Part 265, Subpart F (320 IAC 4-6). The sampling for organics in your waste stream is still recommended by staff as U.S. EPA has indicated the possibility of requiring facilities who have been granted an exemption from the ground water monitoring requirements or a delisting of wastes to prove organics are not present. If at a later date it is found that organic wastes are present in the lagoons, enforcement action may be taken for submission of misleading waiver information.

If you have any questions regarding this correspondence, please contact Mr. Robert Downey at AC 317/633-8476.

Sincerely,

Ralph C. Pickard
Technical Secretary

Footnote A: Neither the Bailly Generating Station or the proposed AFGD system operations will result in discharges of organic materials as a wastestream.

WASTEWATER DISCHARGE (NPDES) PERMIT

DESCRIPTION OF EXISTING DISCHARGES

E-53
E-66

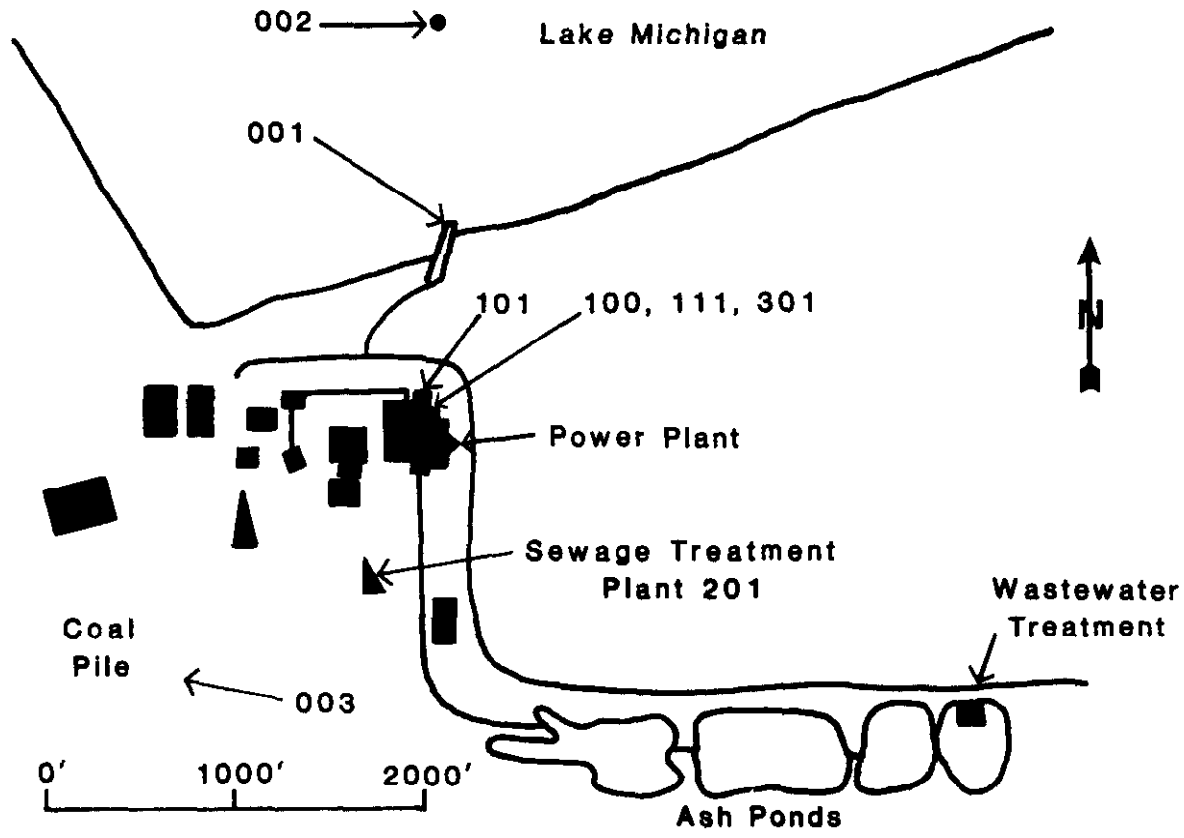
Water for Bailly Generating Station uses is obtained from Lake Michigan. Discharge is through two outfalls to Lake Michigan and several internal outfalls (Figure C-1). Outfalls 001 and 002 are to Lake Michigan and consist of the total plant discharge, which is mostly once through condenser cooling water discharged at Outfall 001. Outfall 002 is an intermittent discharge in front of the plant intake structure to prevent freezing in cold weather. Chlorine may be used in the cooling water, but generally is not needed.

Outfall 101 is the internal discharge from the ash ponds to Outfall 001. This water is usually recycled in-plant causing the discharge to be intermittent. Outfall 301 (boiler blowdown) also contributes to the main Outfall 001.

Periodic metal cleaning wastes (Outfall 111) are discharged to the wastewater treatment facility, thence the ash ponds. Other wastestreams contributing to the ash ponds are the discharge from the sewage plant (Outfall 201), ash sluicing and slag recovery, air heater wash, and precipitation on the surfaces of the ponds.

Outfall 100 is an emergency bypass of the ash ponds of certain low volume wastestreams (floor drains, filter backwash, and water treatment wastes).

Sanitary wastewater (201) is treated by an activated sludge plant with chemical coagulation capability, sand filtration, and effluent chlorination. Coal pile run off (Outfall 003) is by the existing wastewater discharge permit.




Pure Air
a joint venture company
ADVANCED FLUE
GAS DESULFURIZATION

Existing Permitted
Discharge Locations

Figure C-1 E-53, 66

INDIANA DEPARTMENT OF ENVIRONMENTAL MANAGEMENT

AUTHORIZATION TO DISCHARGE UNDER THE

NATIONAL POLLUTANT DISCHARGE ELIMINATION SYSTEM

In compliance with the provisions of the Federal Water Pollution Control Act, as amended (33 U.S.C. 1251 et seq., the "Act"), and the Indiana Environmental Management Act, as amended (IC 13-7),

NORTHERN INDIANA PUBLIC SERVICE COMPANY
BAILLY GENERATING STATION

is authorized to discharge from a coal fired power plant which is located at 246 Bailly Station Road, Chesterton, Indiana, to receiving waters named Lake Michigan and to the groundwater in accordance with effluent limitations, monitoring requirements, and other conditions set forth in Parts I and II hereof.

The permit shall become effective on November 1, 1988.

This permit and the authorization to discharge shall expire at midnight August 31, 1993. In order to receive authorization to discharge beyond the date of expiration, the permittee shall submit such information and forms as are required by the Indiana Department of Environmental Management no later than 180 days prior to the date of expiration.

Signed this 29th day of September, 1988, for the Indiana Department of Environmental Management.

Charles B Bardonner

Charles B. Bardonner
Assistant Commissioner
Office of Water Management

TREATMENT FACILITY CLASSIFICATION

The discharger has a Class C industrial wastewater treatment plant, classified in accordance with 327 IAC 8-12, Classification of Water and Wastewater Treatment Plants.

PART I

A. EFFLUENT LIMITATIONS AND MONITORING REQUIREMENTS

1. During the period beginning on the effective date of this permit and lasting until the expiration date, the permittee is authorized to discharge from Outfall 001 - main outfall and 002 - intake deicing discharge. Such discharge shall be limited and monitored by the permittee as specified below:

| | Quantity or Loading | | | Quality or Concentration | | | Monitoring Requirements | |
|---|---|---|---|---|---|---|---|---|
| Parameter | Monthly Average | Daily Maximum | Units | Monthly Average | Daily Maximum | Units | Measurement Frequency | Sample Type |
| Flow* | Report | Report | MGD | -- | -- | | Daily | 24-Hr. Tota |
| Temperature** | -- | -- | | Report | Report | mg/l | Daily | Continuous |
| Total Residual Chlorine+ | -- | -- | | -- | 0.2 | mg/l | Daily++ | Grab |
| Duration of Chlorination+ | -- | -- | | -- | -- | | Monthly Report | |
| Chlorination Frequency+ | -- | -- | | -- | -- | | Monthly Report | |

*Flow may be estimated by engineering calculations.

**See Other Requirements, Part III of Permit.

+Total Residual Chlorine (TRC) may not be discharged from any single generating unit (condenser) for more than two hours per day. Frequency and Duration of chlorination need only be reported for Outfall 001.

++During discharge of chlorine bearing wastewater.

a. The discharge shall not cause excessive foam in the receiving waters. The discharge shall be essentially free of floating and settleable solids.

b. The discharge shall not contain oil or other substances in amounts sufficient to create a visible film or sheen on the receiving waters.

c. Samples taken in compliance with the monitoring requirements above shall be taken at a point representative of the discharge but prior to entry into Lake Michigan.

2. During the period beginning on the effective date of this permit and lasting until the expiration date, the permittee is authorized to discharge from Outfall 100 - Miscellaneous Low Volume Bypass. Such discharge shall be limited and monitored by the permittee as specified below:

| | Quantity or Loading | | | Quality or Concentration | | | Monitoring Requirements | |
|---|---|---|---|---|---|---|---|---|
| Parameter | Monthly Average | Daily Maximum | Units | Monthly Average | Daily Maximum | Units | Measurement Frequency | Sample Type |
| Flow | Report | Report | MGD | -- | -- | | Daily* | 24-Hr. Tota |
| TSS | -- | -- | | 30 | 100 | mg/l | Daily* | Grab |
| Oil & Grease | -- | -- | | 15 | 20 | mg/ | Daily* | Grab |

*During discharge

a. The pH shall not be less than 6.0 nor greater than 9.0. The pH shall be monitored as follows: by a daily grab sample, during discharge.

b. The discharge shall not cause excessive foam in the receiving waters. The discharge shall be essentially free of floating and settleable solids.

c. The discharge shall not contain oil or other substances in amounts sufficient to create a visible film or sheen on the receiving waters.

d. Samples taken in compliance with the monitoring requirements above shall be taken at a point representative of the discharge but prior to mixing with other wastewaters.

3. During the period beginning on the effective date of this permit and lasting until the expiration date, the permittee is authorized to discharge from Outfall 101 - Ash Pond Discharge. Such discharge shall be limited and monitored by the permittee as specified below:

| | Quantity or Loading | | | Quality or Concentration | | | Monitoring Requirements | |
|---|---|---|---|---|---|---|---|---|
| Parameter | Monthly Average | Daily Maximum | Units | Monthly Average | Daily Maximum | Units | Measurement Frequency | Sample Type |
| Flow | Report | Report | MGD | -- | -- | | Weekly | 24-Hr. Total |
| TSS | -- | -- | | 20 | 30 | mg/l | Weekly | 24-Hr. Comp. |
| Oil & Grease | -- | -- | | 15 | 20 | mg/l | Weekly | Grab |

a. The pH shall not be less than 6.0 nor greater than 9.0. The pH shall be monitored as follows: by a weekly grab sample, except during discharge of metal cleaning wastes from Outfall 111 sampling is to be conducted daily.

b. The discharge shall not cause excessive foam in the receiving waters. The discharge shall be essentially free of floating and settleable solids.

c. The discharge shall not contain oil or other substances in amounts sufficient to create a visible film or sheen on the receiving waters.

d. Samples taken in compliance with the monitoring requirements above shall be taken at a point representative of the discharge but prior to mixing with other wastewaters.

4. During the period beginning on the effective date of this permit and lasting until the expiration date, the permittee is authorized to discharge from Outfall 111 - metal cleaning waste discharge from the wastewater treatment facility. Such discharge shall be limited and monitored by the permittee as specified below:

| | Quantity or Loading | | | Quality or Concentration | | | Monitoring Requirements | |
|---|---|---|---|---|---|---|---|---|
| Parameter | Monthly Average | Daily Maximum | Units | Monthly Average | Daily Maximum | Units | Measurement Frequency | Sample Type |
| Flow | Report | Report | MGD | -- | -- | | Daily* | 24-Hr. Tota |
| T. Iron | -- | -- | | -- | 1.0 | mg/l | Daily* | 24-Hr. Comp |
| T. Copper | -- | -- | | -- | 1.0 | mg/l | Daily* | 24-Hr. Comp |

*These limitations and monitoring requirements apply only during discharge of metal cleaning wastes. The term "metal cleaning wastes" means any wastewater (including chemical cleaning liquor, incinerated metal cleaning wastes (ash), rinse water and passivation solution) resulting from cleaning (with or without chemical compounds) any metal process equipment, including, but not limited to boiler tube cleaning, boiler fireside cleaning and air preheater cleaning. The volume of boiler cleaning waste to which these limitations apply is two boiler volumes, including the initial cleaning solution and the first rinse. For the purpose of this permit, air preheater wash, although defined under 40 CFR 423.12(b)(5) as a metal cleaning waste, is to be considered as a low volume wastestream.

a. Samples taken in compliance with the monitoring requirements above shall be taken at a point representative of the discharge but prior to mixing with other wastestreams.

5. During the period beginning on the effective date of this permit and lasting until the expiration date, the permittee is authorized to discharge from Outfall 201 - sewage Treatment plant. Such discharge shall be limited and monitored by the permittee as specified below:

| | Quantity or Loading | | | Quality or Concentration | | | Monitoring Requirements | |
|---|---|---|---|---|---|---|---|---|
| | Monthly | Daily | | Monthly | Daily | | Measurement | Sample |
| Parameter | Average | Maximum | Units | Average | Maximum | Units | Frequency | Type |
| Flow (MGD) | Report | Report | | -- | -- | | Weekly | 24-Hr. Total |
| $BOD_5$ | -- | -- | | 30 | 45 | mg/l | Weekly | 8-Hr. Comp. |
| Fecal Coliform* | -- | -- | | -- | 400 | 100 ml | Weekly | Grab |
| T. R. Chlorine* | -- | -- | | -- | 2.0 | mg/l | 2 X Weekly | Grab |

*Fecal coliform and chlorine limitations apply only from April 1 through October 31 annually. Sampling is not required, and chlorination should not be practiced November 1 through March 31.

a. Samples taken in compliance with the monitoring requirements above shall be taken at a point representative of the discharge but prior to mixing other wastewaters.

6. During the period beginning on the effective date of this permit and lasting until the expiration date, the permittee is authorized to discharge from Outfall 301 - boiler blowdown. Such discharge shall be limited and monitored by the permittee as specified below:

| | Quantity or Loading | | | Quality or Concentration | | | Monitoring Requirements | |
|---|---|---|---|---|---|---|---|---|
| Parameter | Monthly Average | Daily Maximum | Units | Monthly Average | Daily Maximum | Units | Measurement Frequency | Sample Type |
| Flow | Report | Report | MGD | -- | -- | | 2 X Monthly | 24-Hr. Tota |
| TSS | -- | -- | | 30 | 100 | mg/l | 2 X Monthly | 24-Hr. Comp |
| Oil & Grease | -- | -- | | 15 | 20 | mg/l | 2 X Monthly | Grab |

a. The pH shall not be less than 6.0 nor greater than 9.0. The pH shall be monitored as follows: by a grab sample twice monthly.

b. The discharge shall not cause excessive foam in the receiving waters. The discharge shall be essentially free of floating and settleable solids.

c. The discharge shall not contain oil or other substances in amounts sufficient to create a visible film or sheen on the receiving waters.

d. Samples taken in compliance with the monitoring requirements above shall be taken at a point representative of the discharge but prior to mixing with other wastewaters, except for pH, which may be sampled after mixing with the main discharge. For TSS and oil & grease, the representative location may be from the boiler drum rather than at end-of-pipe.

7. During the period beginning on the effective date of this permit and lasting until the expiration date, the permittee is authorized to discharge from Outfall 003 - coal pile runoff. Such discharge shall be limited and monitored by the permittee as specified below:

| | Quantity or Loading | | | Quality or Concentration | | | Monitoring Requirements | |
|---|---|---|---|---|---|---|---|---|
| Parameter | Monthly Average | Daily Maximum | Units | Monthly Average | Daily Maximum | Units | Measurement Frequency | Sample Type |
| Flow | Report | Report | MGD | -- | -- | | Weekly* | 24-Hr. Total |

*Flow is to be estimated based on precipitation. All parameters are to be monitored weekly during periods of discharge of coal pile runoff to the ground absorption area.

a. The pH shall not be less than 6.0 nor greater than 9.0. The pH shall be monitored as follows: by a weekly grab sample, during periods of discharge.

b. The discharge shall not contain oil or other substances in amounts sufficient to create a visible film or sheen on the receiving waters.

c. Samples taken in compliance with the monitoring requirements above shall be taken at a point representative of the discharge but prior to entry into the ground absorption area.

B. MONITORING AND REPORTING

1. Representative Sampling

Samples and measurements taken as required herein shall be representative of the volume and nature of the monitored discharge.

2. Reporting

The permittee shall submit discharge monitoring reports (DMR-1 Form) to the Indiana Department of Environmental Management containing results obtained during the previous month and shall be postmarked no later than the 28th day of the month following each completed monitoring period. The first report shall be submitted by the 28th day of the month following the month in which the permit becomes effective.

If there is to occur a substantial period of time during which there will be no discharge from an authorized outfall, then the permittee may submit a written request to the Indiana Department of Environmental Management for relief from reporting requirements. The Commissioner may then suspend reporting requirements without public notice or opportunity for public hearing.

The Regional Administrator may request the permittee to submit monitoring reports to the Environmental Protection Agency if it is deemed necessary to assure compliance of the permit.

3. Definitions

a. Monthly Average

(1) Weight Basis - The "monthly average" discharge means the total discharge by weight during a calendar month divided by the number of days in the month that the production or commercial facility was discharging. Where less than daily sampling is required by this permit, the monthly average discharge shall be determined by the summation of the measured daily discharges by weight divided by the number of days during the calendar month when the measurements were made.

(2) Concentration Basis - The "monthly average" concentration means the arithmetic average (proportional to flow) of all daily determinations of concentration made during a calendar month. Daily determinations of concentration made using a composite sample shall be the concentration of the composite sample. When grab samples are used, the daily determination of concentration shall be the arithmetic average (weighted by flow value) of all the samples collected during the calendar day.

b. "Daily Maximum" Discharge

(1) Weight Basis - The "daily maximum" discharge means the total discharge by weight during any calendar day.

(2) Concentration Basis - The "daily maximum" concentration means the daily determination of concentration for any calendar day.

c. 24-Hour Composite Sample--Consists of at least 3 individual flow-proportioned samples of wastewater which are taken at approximately equally spaced time intervals during a 24-hour period and which are combined prior to analysis.

d. Concentration--The weight of any given material present in a unit volume of liquid. Unless otherwise indicated in this permit, concentration values shall be expressed in milligrams per liter (mg/l).

e. The "Regional Administrator" is defined as the Region V Administrator, U.S. EPA, located at 230 South Dearborn Street, Chicago, Illinois 60604.

f. The "Commissioner" is defined as the Commissioner of the Indiana Department of Environmental Management, which is located at the following address: 105 South Meridian Street, Indianapolis, Indiana 46225.

4. Test Procedures

The analytical and sampling methods used shall conform to the current version of 40 CFR, Part 136. The approved methods may be included in the texts listed below. However, different but equivalent methods are allowable if they receive the prior written approval of the State agency and the U.S. Environmental Protection Agency.

(1) Standard Methods for the Examination of Water and Wastewater 16th Edition, 1985, American Public Health Association, Washington, D.C. 20005.

(2) A.S.T.M. Standards, Part 23, Water; Atmospheric Analysis 1972 American Society for Testing and Materials, Philadelphia, PA 19103.

(3) Methods for Chemical Analysis of Water and Wastes June 1974, Revised, March 1983, Environmental Protection Agency, Water Quality Office, Analytical Quality Control Laboratory, 1014 Broadway, Cincinnati, OH 45202.

5. Recording of Results

For each measurement or sample taken pursuant to the requirements of this permit, the permittee shall record the following information:

a. The exact place, date, and time of sampling;

b. The dates the analyses were performed;

c. The person(s) who performed the analyses;

d. The analytical techniques or methods used; and

e. The results of all required analyses.

6. Additional Monitoring by Permittee

If the permittee monitors any pollutant at the location(s) designated herein more frequently than required by this permit, using approved analytical methods as specified above, the results of such monitoring shall be included in the calculation and reporting of the values required in the Monthly Discharge Monitoring Report. Such increased frequency shall also be indicated.

7. Records Retention

All records and information resulting from the monitoring activities required by this permit, including all records of analyses performed and calibration and maintenance of instrumentation and recording from continuous monitoring instrumentation, shall be retained for a minimum of three (3) years, or longer, if requested by the Regional Administrator or the Indiana Department of Environmental Management.

C. REOPENING CLAUSE

1. When the U.S. EPA and the State of Indiana finalize a policy regarding the implementation of 40 CFR 122.26, which addresses stormwater discharges, this permit may be modified, after public notice and opportunity for hearing, to incorporate revised limitations for the control of such discharges.

2. This permit may be modified, or, alternatively revoked and reissued, after public notice and opportunity for hearing, to incorporate revised effluent limitations, with appropriate schedule(s) of compliance, if necessary, after final promulgation and effectiveness of revised Indiana Water Quality Standards.

# PART II
# STANDARD CONDITIONS FOR NPDES PERMITS
# FOR INDUSTRIAL FACILITIES

## SECTION A. GENERAL CONDITIONS

### 1. Duty to Comply

The permittee shall comply with all conditions of this permit. Any permit noncompliance constitutes a violation of the Clean Water Act and the Indiana Environmental Management Act and is grounds for enforcement action, for permit termination, revocation and reissuance, or modification, or for denial of a permit renewal application.

### 2. Penalties for Violations of Permit Conditions

Pursuant to the Indiana Environmental Management Act, any person who violates a permit condition implementing sections 301, 302, 306, 307, 318, or 405 of the Clean Water Act is subject to a civil penalty not to exceed $25,000 per day of such violation. Any person who willfully or negligently violates permit conditions implementing sections 301, 302, 306, 307, or 308 of the Clean Water Act is subject to a fine of not less than $2,500 nor more than $25,000 per day of violation, or by imprisonment for not more than 1 year or both. If the conviction is for a violation committed after a first conviction of such person under this provision, punishment shall be a fine of not more than fifty thousand dollars ($50,000) per day of violation, or by imprisonment for not more than two (2) years, or both.

Except as provided in permit conditions on "Bypassing," Section B, Paragraph 2 and "Upsets," Section B, Paragraph 3, nothing in this permit shall be construed to relieve the permittee from civil or criminal penalties for noncompliance.

### 3. Duty to Mitigate

The permittee shall take all reasonable steps to minimize or correct any adverse impact on the environment resulting from noncompliance with the permit.

### 4. Permit Actions

This permit may be modified, revoked and reissued, or terminated for cause, including, but not limited to, the following:

a. Violation of any terms or conditions of this permit;

b. Obtaining this permit by misrepresentation or failure to disclose fully all relevant facts; or

c. A change in any condition that requires either a temporary or permanent reduction or elimination of the authorized discharge.

The filing of (i) a request by the permittee for a permit modification, revocation and reissuance, or termination, or (ii) a notification of planned changes or anticipated noncompliance does not stay any permit condition.

5. Duty to Provide Information

The permittee shall furnish to the Commissioner, within a reasonable time, any information which the Commissioner may request to determine whether cause exists for modifying, revoking and reissuing, or terminating this permit or to determine compliance with this permit. The permittee shall also furnish to the Commissioner, upon request, copies of records required to be kept by this permit.

6. Duty to Reapply

If the permittee wishes to continue an activity regulated by this permit after the expiration date of this permit, the permittee must apply for and obtain a new permit. The application should be submitted at least 180 days before the expiration date of this permit. The Commissioner may grant permission to submit an application less than 180 days in advance but no later than the permit expiration date.

7. Transfers

This permit is nontransferable to any person except after notice to the Commissioner pursuant to Regulation 327 IAC 5-2-6(c). The Commissioner may require modification or revocation and reissuance of the permit to change the name of the permittee and incorporate such other requirements as may be necessary under the Clean Water Act.

8. Toxic Pollutants

Notwithstanding Paragraph A-4, above, if a toxic effluent standard or prohibition (including any schedule of compliance specified in such effluent standard or prohibition) is established under Section 307(a) of the Clean Water Act for a toxic pollutant which is present in the discharge and such standard or prohibition is more stringent than any limitation for such pollutant in this permit, this permit shall be modified or revoked and reissued to conform to the toxic effluent standard or prohibition.

The permittee shall comply with effluent standards or prohibitions established under section 307(a) of the Clean Water Act for toxic pollutants injurious to human health within the time provided in the regulations that establish those standards or prohibitions, even if the permit has not yet been modified to incorporate the requirement.

9. Containment Facilities

When cyanide or cyanogen compounds are used in any of the processes at this facility, the permittee shall provide approved facilities for the containment of any losses of these compounds in accordance with the requirements of Water Pollution Control Board Regulation 327 IAC 2-2-1.

10. Operator Certification

The permittee shall have the waste treatment facilities under the direct supervision of an operator certified by the Commissioner as required by IC 13-1-6.

11. Oil and Hazardous Substance Liability

Nothing in this permit shall be construed to relieve the permittee from any responsibilities, liabilities, or penalties to which the permittee is or may be subject under Section 311 of the Clean Water Act.

12. Property Rights

The issuance of this permit does not convey any property rights of any sort or any exclusive privileges, nor does it authorize any injury to private property or an invasion of personal rights, nor any infringement of Federal, State, or local laws or regulations.

13. Severability

The provisions of this permit are severable and, if any provision of this permit or the application of any provision of this permit to any circumstance is held invalid, the application of such provision to other circumstances and the remainder of this permit shall not be affected thereby.

14. Inspection and Entry

The permittee shall allow the Commissioner, or an authorized representative, upon the presentation of credentials and other documents as may be required by law, to:

a. Enter upon the permittee's premises where a regulated facility or activity is located or conducted, or where records must be kept under the conditions of this permit;

b. Have access to and copy, at reasonable times, any records that must be kept under the conditions of this permit;

c. Inspect at reasonable times any facilities, equipment (including monitoring and control equipment), practices, or operations regulated or required under this permit; and

d. Sample or monitor at reasonable times, for the purposes of assuring permit compliance or as otherwise authorized by the Clean Water Act, any substances or parameters at any location.

15. Construction Permit

The permittee shall not construct, install, or modify any water pollution control facility without a valid construction permit issued by the Indiana Department of Environmental Management pursuant to 327 IAC 3-2.

SECTION B. MANAGEMENT REQUIREMENTS

1. Proper Operation and Maintenance

The permittee shall at all times maintain in good working order and efficiently operate all facilities and systems for wastewater collection and treatment which are installed or used by the permittee and which are necessary for achieving compliance with the terms and conditions of this permit.

2. Bypass of Treatment Facilities

a. Definitions:

(1) "Bypass" means the intentional diversion of a waste stream from any portion of a treatment facility normally utilized for treatment of the waste stream.

(2) "Severe property damage" means substantial physical damage to property, damage to the treatment facilities which would cause them to become inoperable, or substantial and permanent loss of natural resources which can reasonably be expected to occur in the absence of a bypass. Severe property damage does not mean economic loss caused by delays in production at the permittee's facility.

b. (Prohibition of Bypass) Bypass which causes or is likely to cause applicable effluent limitations to be exceeded is prohibited unless the following three conditions are met:

(1) Bypass is unavoidable to prevent loss of life, personal injury or severe property damage;

(2) There are no feasible alternatives to bypass, such as the use of auxiliary treatment facilities, retention of untreated wastes, or maintenance during normal period of equipment down-time; and

(3) The permittee submits notice of an unanticipated bypass to the Commissioner within 24 hours of becoming aware of the bypass (if this information is provided orally, a written submission must be provided within five days). Where the permittee knows or should have known in advance of the need for a bypass, this prior notification shall be submitted for approval to the Commissioner, if possible, at least ten days before the date of the bypass.

c. An anticipated bypass which meets the three criteria of Paragraph b of this subsection may be allowed under conditions determined to be necessary by the Commissioner to minimize any adverse effects.

3. Upset Conditions

a. Definition: "Upset" means an exceptional incident in which there is unintentional and temporary noncompliance with technology-based permit effluent limitations because of factors beyond the reasonable control of the permittee. An upset does not include noncompliance to the extent caused by operational error, improperly designed treatment facilities, inadequate treatment facilities, lack of preventive maintenance, or careless or improper operation.

b. (Effect of an upset) An upset shall constitute an affirmative defense to an action brought for noncompliance with such technology-based permit effluent limitations if the requirements of Paragraph c of this subsection are met.

c. (Conditions necessary for a demonstration of upset) A permittee who wishes to establish the affirmative defense of upset shall demonstrate, through properly signed, contemporaneous operating logs or other relevant evidence, that:

(1) An upset occurred and the permittee has identified the specific cause(s) of the upset, if possible;

(2) The permitted facility was at the time being operated in compliance with proper operation and maintenance procedures; and

(3) The permittee complied with any remedial measures required under Paragraph A.3 of this Part.

4. Removed Substances

Solids, sludges, filter backwash, or other pollutants removed from or resulting from treatment or control of wastewaters shall be disposed of in a manner such as to prevent any pollutant from such materials from entering waters of the State and to be in compliance with all Indiana statutes and regulations relative to liquid and/or solid waste disposal.

SECTION C. REPORTING REQUIREMENTS

1. Planned Changes in Facility or Discharge

Any anticipated facility expansions, production increases, or process modifications which will result in new, different, or increased discharges of pollutants must be reported by submission of a new NPDES application or, if such changes will not violate the effluent limitations specified in this permit, by advance notice to the permit issuing authority of such changes. Following such notice, the permit may be modified to revise existing pollutant limitations and/or to specify and limit any pollutants not previously limited.

2. Monitoring Reports

Monitoring results shall be reported at the intervals and in the form specified in Part I.B.2.

3. Compliance Schedules

Reports of compliance or noncompliance with interim and final requirements contained in any compliance schedule of this permit shall be submitted no later than 14 days following each schedule date. Any reports of noncompliance shall include the cause of noncompliance, any remedial actions taken, and the probability of meeting the next scheduled requirement.

4. Twenty-Four Hour Reporting

The permittee shall report information on the following types of noncompliance within 24 hours from the time permittee becomes aware of such noncompliance:

a. Any unanticipated bypass which exceeds any effluent limitation in the permit;

b. Violation of a maximum daily discharge limitation for any of the pollutants listed by the Commissioner in the permit to be reported within 24 hours; and

c. Any noncompliance which may pose a significant danger to human health or the environment.

A written submission shall also be provided within 5 days of the time the permittee becomes aware of the circumstances. The written submission shall contain a description of the noncompliance and its cause; the period of noncompliance, including exact dates and times, and if the noncompliance has not been corrected the anticipated time it is expected to continue; and steps taken or planned to reduce and eliminate the noncompliance and prevent its recurrence. The Commissioner may waive the written report on a case-by-case basis if the oral report has been received within 24 hours.

5. Other Noncompliance

The permittee shall report any instance of noncompliance not reported under Paragraph 3 or 4 of this Section at the time the pertinent Discharge Monitoring Report is submitted. The report shall contain the information specified in Paragraph 4 of this Section.

6. Other Information

Where the permittee becomes aware that he failed to submit any relevant facts or submitted incorrect information in a permit application or in any report to the Commissioner, the permittee shall promptly submit such facts or corrected information.

7. Changes in Discharge of Toxic Substances

The permittee shall notify the Commissioner as soon as it knows or has reason to believe:

a. That any activity has occurred or will occur which would result in the discharge of any pollutant identified as toxic, pursuant to Section 307(a) of the Clean Water Act which is not limited in the permit, if that discharge will exceed the highest of the following "notification levels:"

(1) One hundred micrograms per liter (100 ug/l);

(2) Two hundred micrograms per liter (200 ug/l) for acrolein and acrylonitrile; five hundred micrograms per liter (500 ug/l) for 2,4-dinitrophenol and for 2-methyl-4,6-dinitrophenol; and one milligram per liter (1 mg/l) for antimony;

(3) Five (5) times the maximum concentration value reported for that pollutant in the permit application; or

(4) The level established in Part III of the permit by the Commissioner.

b. That it has begun or expects to begin to use or manufacture as an intermediate or final product or byproduct any toxic pollutant which was not reported in the permit application.

8. Signatory Requirements

a. All reports required by the permit and other information requested by the Commissioner shall be signed and certified by a person described below or by a duly authorized representative of that person:

(1) For a corporation: by a principal executive officer of at least the level of vice-president (including a person who is not a vice-president but performs similar policy-making functions for the corporation);

(2) For a partnership or sole proprietorship: by a general partner or the proprietor, respectively; or

(3) For a Federal, State, or local governmental body or an agency or political subdivision thereof: by either a principal executive officer or ranking elected official.

b. A person is a duly authorized representative only if:

(1) The authorization is made in writing by a person described above.

(2) The authorization specifies either an individual or a position having responsibility for the overall operation of the regulated facility or activity, such as the position of plant manager, operator of a well or a well field, superintendent, or position of equivalent responsibility. (A duly authorized representative may thus be either a named individual or any individual occupying a named position.); and

(3) The authorization is submitted to the Commissioner.

c. Certification. Any person signing a document under this section shall make the following certification:

"I certify under penalty of law that I have personally examined and am familiar with the information submitted in this document and all attachments and that, based on my inquiry of those individuals immediately responsible for obtaining the information, I believe that the information is true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment."

9. Availability of Reports

Except for data determined to be confidential under Water Pollution Control Board Regulation 327 IAC 12, all reports prepared in accordance with the terms of this permit shall be available for public inspection at the offices of the Indiana Department of Environmental Management and the Regional Administrator. As required by the Clean Water Act, permit applications, permits, and effluent data shall not be considered confidential.

10. Penalties for Falsification of Reports

The Indiana Environmental Management Act provides that any person who knowingly makes any false statement, representation, or certification in any record or other document submitted or required to be maintained under this permit, including monitoring reports or reports of compliance or noncompliance, shall, upon conviction, be punished by a fine of not more than $10,000 per violation, or by imprisonment for not more than 6 months per violation, or by both.

Part III
Other Requirements

A. Thermal Effluent Requirements

As a result of approval of the 316(a) demonstration study submitted in September 1976, no thermal effluent limitations are included in this permit. Indiana Water Quality Standards (IWQS) for temperature are waived unless the generating capacity is expanded, or the mode of operation of the existing condensers is changed to allow for additional thermal discharge.

B. Intake Structures

The 316(b) demonstration submitted for this plant has been approved. Although it appears that significant numbers of fish are impinged due to the nature of the intake pipe, the Indiana Department of Environmental Management does not believe that a significant reduction of impingement could be attained by any reasonably practical measures such as the addition of mesh screen over the intake pipe, since NIPSCO has demonstrated by their letter of September 6, 1983, that this is impractical due to the presence of "dune grass" in the intake which would soon obstruct any small diameter screens.

No further submission of information on this subject is required at the time of reissuance of this permit.

C. Chlorine Concentration

The total exposure time of TRC resulting from chlorination of the condenser cooling water shall not exceed two hours per day per generating unit.

D. Intake Screen Wash

There shall be no discharge of debris from intake screen washing operations which will settle to form objectionable deposits, which is in amounts sufficient to be unsightly or deleterious, or which will produce colors or odors constituting a nuisance.

E. Polychlorinated Biphenyl

There shall be no discharge of polychlorinated biphenyl (PCB) compounds such as those commonly used for transformer fluid, in accordance with 40 CFR 423.12(b) and 423.13(a).

P/Bailly Station P11

AIR EMISSION PERMIT (DRAFT OPERATING PERMIT)

OFFICE OF AIR MANAGEMENT
INDIANA DEPARTMENT OF ENVIRONMENTAL MANAGEMENT

PROPOSED OPERATION PERMIT

DRAFT

Northern Indiana Public Service Company
Bailly Generating Station
at Burns Harbor
Chesterton, Indiana

has applied for authorization to operate:

the cyclonic (subcritical) coal fired boiler (Unit #7), rated at 1638 million Btu's per hour energy input, used to generate up to 183 megawatts (gross) of electricity. Particulate matter emissions are controlled by an electrostatic precipitator. Controlled boiler emissions are exhausted to the atmosphere through a 400 foot tall stack having a 15.25 foot exit diameter that is shared with Unit #8.

It is proposed to issue this permit under provisions of 326 IAC Article 2 with the following conditions:

1. That the data and information supplied in the application shall be considered part of this permit. Prior to any change in the operation which may result in an increase in potential emissions exceeding those specified in 326 IAC 2-1-1, this change must be approved by the Office of Air Management.
2. That the permittee shall comply with the provisions of the Indiana Environmental Management Law (IC 13-7), Air Pollution Control Law (IC 13-1-1) and the rules promulgated thereunder.
3. That the equipment shall be operated and maintained in accordance with the manufacturer's specifications.

(See Page 2)

Pending Identification No. 64-07-92-0245

Expiration Date July 1, 1992

THIS IS NOT A PERMIT

Conditions Continued:

4. That pursuant to 326 IAC 6-2 Section 1(b), particulate matter emissions to the atmosphere from this boiler shall be limited to 0.22 pounds per million Btu's of energy input.

5. That pursuant to Section 4 (e) of 326 IAC 2-1, stack tests to determine particulate matter emissions from this boiler shall be conducted pursuant to 326 IAC 3-2. The first test shall be performed during calendar year 1990 with another test to be performed during calendar year 1992. The Office of Air Management (OAM) shall be notified of the test dates in advance pursuant with 326 IAC 3-2-3, and test reports shall be submitted to the OAM within 45 days of the test.

6. That pursuant to 326 IAC 7-1-21 (a)(2), sulfur dioxide emissions from Boiler Nos. 7 and 8 shall be limited to 6.0 lbs/MMBtu. Boilers 7 and 8 shall be fired with coal, fuel oil or natural gas.

7. That the station shall sample and analyze the coal used in Boiler Nos. 7 and 8 on a daily basis (Note: Analysis based on composite samples for weekends and holidays will be acceptable.) The above analysis will include all of the following on an as bunkered or as burned basis: heat content, % sulfur, % ash and % moisture. Pursuant to 326 IAC 7-1-3, quarterly reports of the 30-day rolling weighted average emission rate (in pounds per million Btu) for each day of the quarter shall be submitted by the last day of the month following the end of the quarter. Records of the daily average sulfur content, heat content and sulfur dioxide emission rate (in pounds per million Btu) shall be retained at the station for three years ~~and submitted with the quarterly reports~~ or made available upon request.

8. That visible emissions shall be limited to 40% opacity pursuant to 326 IAC 5-1, Section 2(a)(1), for attainment areas.

9. That pursuant to Section 3(d) of 326 IAC 5-1, a special temporary exemption is hereby granted to allow, when necessary, the following visible stack emissions during boiler startups and shutdowns.

   (a) During boiler startups an exemption from the 40% opacity limit is allowed for up to 10 (ten) six-minute average periods, or until the flue gas temperature entering the electrostatic precipitator reaches 250 degress $F_r$ which ever occurs first. In the event that the above is exceeded due to special circumstances (such as a cold startup after an extended outage), NIPSCO shall report this to the OAM within one working day of the occurrence. This report shall also include the total accumulated periods of excess opacity and the reason why the extended time was necessary. During these startup periods all reasonable efforts shall be made to minimize the number and magnitude of the exceedances.

   (b) During boiler shutdowns an exemption from the 40% opacity limit is allowed for up to 10 (ten) six-minute average periods. During these shutdown periods all reasonable efforts shall be made to minimize the number and magnitude of the exceedances.

10. That at no time shall the combined rate of heat input for Boiler Nos. 7 and 8 exceed a total of 5,012 million Btu's per hour.

OFFICE OF AIR MANAGEMENT
INDIANA DEPARTMENT OF ENVIRONMENTAL MANAGEMENT

PROPOSED OPERATION PERMIT

DRAFT

Northern Indiana Public Service Company
Bailly Generating Station
at Burns Harbor
Chesterton, Indiana

has applied for authorization to operate:

the cyclonic (subcritical) coal fired boiler (Unit #8), rated at 3374 million Btu's per hour energy input, used to generate up to 335 megawatts (gross) of electricity. Particulate matter emissions are controlled by an electrostatic precipitator. Controlled boiler emissions are exhausted to the atmosphere through a 400 foot tall stack having a 15.25 foot exit diameter that is shared with Unit #7.

It is proposed to issue this permit under provisions of 326 IAC Article 2 with the following conditions:

1. That the data and information supplied in the application shall be considered part of this permit. Prior to any change in the operation which may result in an increase in potential emissions exceeding those specified in 326 IAC 2-1-1, this change must be approved by the Office of Air Management.
2. That the permittee shall comply with the provisions of the Indiana Environmental Management Law (IC 13-7), Air Pollution Control Law (IC 13-1-1) and the rules promulgated thereunder.
3. That the equipment shall be operated and maintained in accordance with the manufacturer's specifications.

(See Page 2)

Pending Identification No. 64-07-92-0246

Expiration Date July 1, 1992

THIS IS NOT A PERMIT

Conditions Continued:

4. That pursuant to 326 IAC 6-2 Section 1(b), particulate matter emissions to the atmosphere from this boiler shall be limited to 0.22 pounds per million Btu's of energy input.

5. That pursuant to Section 4 (e) of 326 IAC 2-1, stack tests to determine particulate matter emissions from this boiler shall be conducted pursuant to 326 IAC 3-2. The first test shall be performed during calendar year 1990 with another test to be performed during calendar year 1992. The Office of Air Management (OAM) shall be notified of the test dates in advance pursuant with 326 IAC 3-2-3, and test reports shall be submitted to the OAM within 45 days of the test.

6. That pursuant to 326 IAC 7-1-21 (a)(2), sulfur dioxide emissions from Boiler Nos. 7 and 8 shall be limited to 6.0 lbs/MMBtu. Boilers 7 and 8 shall be fired with coal, fuel oil or natural gas.

7. That the station shall sample and analyze the coal used in Boiler Nos. 7 and 8 on a daily basis (Note: Analysis based on composite samples for weekends and holidays will be acceptable.) The above analysis will include all of the following on an as bunkered or as burned basis: heat content, % sulfur, % ash and % moisture. Pursuant to 326 IAC 7-1-3, quarterly reports of the 30-day rolling weighted average emission rate (in pounds per million Btu) for each day of the quarter shall be submitted by the last day of the month following the end of the quarter. Records of the daily average sulfur content, heat content and sulfur dioxide emission rate (in pounds per million Btu) shall be retained at the station for three years ~~and submitted with the quarterly reports~~ or made available upon request.

8. That visible emissions shall be limited to 40% opacity pursuant to 326 IAC 5-1, Section 2(a)(1), for attainment areas.

9. That pursuant to Section 3(d) of 326 IAC 5-1, a special temporary exemption is hereby granted to allow, when necessary, the following visible stack emissions during boiler startups and shutdowns.

   (a) During boiler startups an exemption from the 40% opacity limit is allowed for up to 10 (ten) six-minute average periods, or until the flue gas temperature entering the electrostatic precipitator reaches 250 degress F, which ever occurs first. In the event that the above is exceeded due to special circumstances (such as a cold startup after an extended outage), NIPSCO shall report this to the OAM within one working day of the occurrence. This report shall also include the total accumulated periods of excess opacity and the reason why the extended time was necessary. During these startup periods all reasonable efforts shall be made to minimize the number and magnitude of the exceedances.

   (b) During boiler shutdowns an exemption from the 40% opacity limit is allowed for up to 10 (ten) six-minute average periods. During these shutdown periods all reasonable efforts shall be made to minimize the number and magnitude of the exceedances.

10. That at no time shall the combined rate of heat input for Boiler Nos. 7 and 8 exceed a total of 5.012 million Btu's per hour.

OFFICE OF AIR MANAGEMENT
INDIANA DEPARTMENT OF ENVIRONMENTAL MANAGEMENT

PROPOSED OPERATION PERMIT

DRAFT

Northern Indiana Public Service Company
Bailly Generating Station
at Burns Harbor
Chesterton, Indiana

has applied for authorization to operate:

the oil fired gas turbine (Unit #10), rated at 435 million Btu's per hour energy input, used to generate electricity during periods of peak demand. Emissions are exhausted to the atmosphere through a 40 foot tall stack having a 14 foot exit diameter.

It is proposed to issue this permit under provisions of 326 IAC Article 2 with the following conditions:

1. That the data and information supplied in the application shall be considered part of this permit. Prior to any change in the operation which may result in an increase in potential emissions exceeding those specified in 326 IAC 2-1-1, this change must be approved by the Office of Air Management.
2. That the permittee shall comply with the provisions of the Indiana Environmental Management Law (IC 13-7), Air Pollution Control Law (IC 13-1-1) and the rules promulgated thereunder.
3. That the equipment shall be operated and maintained in accordance with the manufacturer's specifications.
4. That pursuant to 326 IAC 7-1-21(a)(2), gas turbine Unit #10 shall burn natural gas only. Records of Unit #10 fuel usage shall be maintained and made available to the OAM upon request.

Pending Identification No. 64-07-92-0247

Expiration Date July 1, 1992

THIS IS NOT A PERMIT

OFFICE OF AIR MANAGEMENT
INDIANA DEPARTMENT OF ENVIRONMENTAL MANAGEMENT

PROPOSED OPERATION PERMIT

DRAFT

Northern Indiana Public Service Company
Bailly Generating Station
at Burns Harbor
Chesterton, Indiana

has applied for authorization to operate:

the facilities associated with the fuel and dry flyash handling and storage systems, serving the coal fired boilers.

It is proposed to issue this permit under provisions of 326 IAC Article 2 with the following conditions:

1. That the data and information supplied in the application shall be considered part of this permit. Prior to any change in the operation which may result in an increase in potential emissions exceeding those specified in 326 IAC 2-1-1, this change must be approved by the Office of Air Management.
2. That the permittee shall comply with the provisions of the Indiana Environmental Management Law (IC 13-7), Air Pollution Control Law (IC 13-1-1) and the rules promulgated thereunder.
3. That the equipment shall be operated and maintained in accordance with the manufacturer's specifications.
4. That fugitive dust emissions shall comply with 326 IAC 6-4.

Pending Identification No. 64-08-92-0248

Expiration Date July 1, 1992

THIS IS NOT A PERMIT

# APPENDIX D

## DOCUMENTATION OF AGENCY CONTACTS

During the week of January 2, 1989, AFGD project team members met with the Indiana regulatory agencies which have been identified as having jurisdiction over the project. Relevant excerpts from the meeting notes for these contacts are contained in this Appendix.

The project team members that met with the agencies were:

- Air Products and Chemicals, Inc.
- Enviroplan, Inc.
- Northern Indiana Public Service Company
- Stearns-Roger Division of United Engineers & Constructors Inc.

The agencies contacted were as follows:

- Indiana Department of Fire Prevention and Building Safety
- Office of Water Management (IDEM)
- Office of Solid and Hazardous Waste Management (IDEM)
- Office of Air Management (IDEM)
- Porter County Plan Commission

DATE: January 4, 1989

SUBJECT: Indiana Department of Fire Prevention and Building Safety (DFB) Permit Requirements

LOCATION: Indiana Department of Fire Prevention and Building Safety Offices
1099 N. Meridian Street/Suite 900
Indianapolis, IN

RELEVANT EXCERPT:

The DFB indicated that they process all building permit applications for a number of groups including the State Fire Marshall and the Bureau of Elevator Safety. The DFB conducts a plan review for life and safety features of the project. The DFB does not really get into a structural review, although structural design may be scrutinized as it relates to the life and safety review.

Indiana currently follows the 1985 UBC with the Indiana amendments which basically replaces the first three UBC chapters. After April, 1989 the 1988 UBC will be used. Indiana also follows the NEC and NFPA. The DFB follows the General Administrative Rules (GAR) which specifies how they operate. Chapter 5 UBC requirements should be closely reviewed and followed. All codes generally have Indiana amendments. The DFB commented that as of 1/3/89, Indiana follows the BOCA Plumbing Code. Also, the 1988 UBC Mechanical Code is now followed.

If the project's design has a major change from the appropriate codes, a variance has to be filed. The variance will then be evaluated the first week of each month by the 15-member Building Commission.

The DFB said that handicapped parking is not required until there are more than 50 parking spaces. However, if there is handicapped parking within about 300 feet of a structure, the DFB will probably accept this. Handicapped parking requirements are based on the appropriate ANSI code.

The DFB said that their plan review considers occupancy vs. building sizes (square footage and number of stories), fire-proofing, construction type, exiting (including staircase enclosures) and fire protection. Although the latter is covered by a separate application. The DFB said that local contractors at one time had difficulties with the sprinkler system requirements. However, they are now knowledgeable about these requirements.

The Bailly Station is in Seismic Zone 1 according to the UBC, although the southern part of Indiana is in Zone 2.

The DFB will accept partial filings for different structures. However, after filing the building foundation permit for a structure the applicant has 30 days according to the GAR to file everything else (plumbing, electrical, etc.). Oftentimes the DFB will allow 45 days, then send out a 15-day notice to complete the filing. After 60 days an application has to be refiled. If partial filings are used (partial program), subsequent submissions must be listed on the building permit application form.

A six-digit filing number will be assigned to submittals and this should be referred to in any correspondence. Once the number is known, it could be placed on drawings (title block) or specifications. Applications will be received initially by the DFB counter and then routed to the plan reviewer. Typical applications are processed in

10 to 15 working days. If the project has not heard from the DFB within three weeks, the project should call the DFB.

A building permit application consists of the appropriate form, filing fee and design information. The first submittal should also include a project description and a plot plan. Subsequent submittals require only a plot plan especially for each new building.

The filing fees include: $100 partial filing fee; $50 building/foundation filing fee for two-day approval or $75 fee for a foundation review for a four-hour turnaround. The foundation review includes an examination of footing width, insulation, cross ties and anchor bolts. Once the application is approved, the DFB will assess a construction fee indicated in the fee schedule. If Porter County does not have a building inspector, an additional 50 percent will be added to the fee for the state to do the inspections.

Any size drawings are acceptable, although 23 x 36 inch would be good. The specifications and drawings must be AFC. Anything stamped "preliminary" will be rejected. Specifications and drawings must be stamped and signed (under the seal) by an Indiana PE (architect or engineer). It would help to include the date of signing and expiration date of the seal. The original mylar should be stamped and copies submitted to the DFB.

If there are design changes after the DFB issues its approval, an addendum has to be submitted for approval. If the changes are made during construction, the DFB can expedite its approval.

If during the DFB's review of the design information, more than 10 unacceptable features (conditions) are found, the DFB puts the review on hold. These conditions

must be resolved by resubmitting the plans before the review will continue. The DFB said that this is more of a problem with non-resident engineering firms. For example, the Indiana code allows for a four-hour fire wall being equivalent to 60 feet of yard space (yard space allowable). But this only can be used on one side of a building one time. Non-residents are usually not aware of this aspect of the code.

Once the DFB issues its approval, the approved plans and release placard must be maintained on-site. Following approval, the project needs to make arrangements to have inspections. These are done by the state or a local inspector. The inspections include one by the Bureau of Elevator Safety and other inspections of foundations, structural rough in, and a final inspection. However, the inspectors can drop by unannounced. If there is a problem the inspectors cannot stop construction, they will refer the problem to the state attorney general who will stop construction. Following the final inspection, certificates of occupancy are issued either by the state or local jurisdiction.

The DFB said that in some areas of the state as of 4/1/88, the appropriate jurisdiction needed to provide (1) a city or county ordinance stating that the state building code will be followed, and (2) evidence of the number of people and the names of people who will do inspections. If the local municipalities do not provide this information, the state is responsible for construction inspections. The municipalities do the inspections if they have provided the indicated information. The DFB provided a list indicating that Porter County currently does not have a building inspector.

DATE: January 4, 1989

SUBJECT: Office of Water Management (OWM) (IDEM) Permit Requirements

LOCATION: Office of Water Management
Chesapeake Building
105 South Meridian St.
Indianapolis, IN

RELEVANT EXCERPT:

The potential wastewater streams were discussed. The OWM indicated that it would prefer that stormwater runoff, sanitary wastes, and potentially WES wastewater be directed to the on-site ponds. If this is done the OWM would like a letter with information on the discharges to the ponds (type, frequency, quantity, quality). The OWM said that it would probably approve these discharges without additional monitoring requirements. The current Northern Indiana NPDES permit requires that any change in Bailly Station wastewater discharges be reported to the OWM by letter.

The OWM said that the project should make sure that the existing wastewater treatment plants can handle the proposed wastewater flows. This is particularly true for sanitary wastes.

After submitting the letter with the wastewater information, it will take the OWM two to three weeks to review it. An approval will probably be issued by letter then, if everything is okay, without any monitoring requirement. If everything is not okay, additional information may be required or possibly the existing NPDES permit may have to be modified.

The existing NPDES permit would also have to be modified if separate or new outfall points (other than the existing ponds) are proposed. This would possibly require submittal of an EPA approved form (e.g., EPA Form 2D) and supporting documentation. Regulations require that this information be submitted 180 days prior to discharging. During this period, the OWM will review the information and have a 30-day public comment period on a draft NPDES permit. The permit would probably include some discharge monitoring requirements.

If the WES is not used as currently planned and is discharged offsite, the OWM will require wastewater quality information. This would probably include chlorides, pH and TSS.

In the meeting the OWM said that most Indiana streams are classified as suitable for general use and aquatic life.

DATE: January 4, 1989

SUBJECT: Office of Solid and Hazardous Waste Management (OSHWM) (IDEM) Permit Requirements

LOCATION: Office of Solid and Hazardous Waste Management
Chesapeake Building
105 South Meridian St.
Indianapolis, IN

RELEVANT EXCERPT:

Ash from the Bailly Station is currently sold to a fly ash marketing firm which landfills it in Illinois or sells it for other uses. Prior to sale of the ash, it is stored in a silo. The AFGD system ash also will be sold for other uses or landfilled. The OSHWM said that if the ash is disposed in Indiana, the project can send a letter to OSHWM saying that there is coal ash for disposal. The OSHWM will then probably send a letter back saying that the coal ash is a solid waste and can be landfilled. However, the OSHWM said that it would like to see EP toxicity test information and analyses for the parameters included in the secondary ground water standards. The OSHWM cannot require this by law. The latter includes chlorides which the OSHWM indicated interest. If the analyses are acceptable according to the regulations, they can be landfilled as a solid waste. If the analyses show a problem, the ash will be called a special waste or hazardous waste by the state and will have to be handled appropriately. The OSHWM said that if analytical data is not provided to them, even if they classify the ash as a solid waste, the landfill may require analytical data.

The OSHWM will initially consider the gypsum as a special waste resulting from industrial pollution control.

Because it will have only about 8 to 10 percent moisture, as explained by Stearns-Roger and Northern Indiana, the gypsum is not considered a free liquid. Thus, the gypsum could probably be disposed in a special waste landfill similar to the Wheeler landfill. Special waste landfills must meet ground water monitoring requirements and the operators must be in good standing with the OSHWM.

In order to confirm the appropriate disposal of the gypsum the OSHWM wants a letter describing the gypsum and the proposed landfill where it will be disposed. Two or three sites may be proposed if the waste volume justifies more than one site. The gypsum waste should be characterized by the EP toxicity test (one sample) and analysis for chlorides. This will allow the OSHWM to determine if the gypsum is indeed a special waste. The OSHWM said that the project should check with them prior to doing any analyses to confirm sampling techniques (basically follow SW-846) and the appropriate analyses.

The project cannot dispose of gypsum until an evaluation has been made by the OSHWM. However, the OSHWM might possibly issue a 90-day approval for disposing the gypsum prior to AFGD system startup if test data from existing facilities can be provided. The data also may be provided from bench tests. Once the AFGD system is operating the OSHWM would then require that the appropriate analyses be made. Even if the project analyzes the gypsum a landfill may do analyses on its own.

An option besides using an existing landfill is to create the project's own restricted waste site for disposing ash and/or gypsum. If the project permits a new landfill the OSHWM will require EP toxicity information and other tests for secondary drinking water standards. The analyses would then be evaluated according to the restricted waste site

classification where Type I is basically a hazardous waste site and Type II through IV take different categories of non-hazardous wastes. The analyses would have to be based on three samples. Before collecting samples and doing the analyses, everything should be approved by the OSHWM.

For an evaluation of disposing waste in an existing landfill, the OSHWM requires about a 30-day review time. If the project permits a landfill to existing standards, the evaluation time would be about 6 to 12 months. Currently the OSHWM issues one-year approvals for waste disposal with some retesting in advance of the one-year expiration date. The OSHWM is looking at starting to issue five-year permits with repeat analyses.

The OSHWM said that coal ash is sometimes disposed in mines with Department of Natural Resources (DNR) approval, not OSHWM approval. The OSHWM said that they were not sure if the gypsum could be disposed in mines. The OSHWM would have to evaluate this disposal option, possibly in consultation with DNR.

DATE: January 5, 1989

SUBJECT: Office of Air Management (OAM) (IDEM) Permit Requirements

LOCATION: Office of Air Management
Chesapeake Building
105 South Meridian St.
Indianapolis, IN

RELEVANT EXCERPT:

It was agreed that the installation of the scrubber is not in response to any regulatory requirement. Also, the OAM indicated that the pollution control device does not fall under PSD regulations.

Ash will continue to be stored in an on-site silo. Limestone also probably will be stored in an on-site silo. Current plans are to purchase pulverized limestone instead of having extensive on-site crushing facilities.

During the demonstration period various sulfur content containing coals will be evaluated. Some coal will always be maintained on-site that meets existing permit conditions for emissions.

The OAM said that for known technologies sometimes they can merely process a registration based on information provided in a letter. However, for the AFGD system which involves an unknown technology, they want a Permit to Construct (PTC) Application. The PTC can be applied for by either the owner of the system or the operator (either

Northern Indiana or Pure Air can hold the permit). The project participants need to propose who will hold the PTC and who is responsible for various emissions on-site and discuss this with the OAM. The OAM said that Northern Indiana probably will be held responsible for non-AFGD system emission control (e.g. fugitive dust). The PTC is required so that the OAM can set maximum limits on various parameters to protect air quality and to determine compliance. Probably emission limits will be placed on the same parameters that are in the existing air permit ($SO_2$, TSP, opacity, etc). The OAM did not believe that $NO_x$ would be monitored or would be a problem. The OAM thought the TSP might be a problem, although Northern Indiana and Stearns-Roger indicated that the AFGD system was not supposed to impact TSP.

The PTC application should include information on the process, stack parameters (including assurance that the stack has an adequate height), and proposed emission limits for operation of the AFGD system. The latter should be supported by modeling using methods approved by the OAM.

The PTC application requires a $100 filing fee, plus expenses for the OAM's air quality review. The total review time from the time the PTC application is deemed complete is four to five months. This includes one month for OAM modeling activities and a 30-day public comment period. The latter may result in a public hearing if the OAM deems it appropriate based on the comments received (reasonable technical basis). This then requires a 21-day notice period, time to set the hearing and finalize a report. Project participants may be able to avoid a public hearing by working with the organizations who make comments to resolve relevant issues.

As part of the public notice, the OAM will issue a Technical Support Document (TSD). The TSD will contain a proposed permit with emission limitations and conditions. One condition might be having an opacity monitor following the ESP.

The OAM will require source testing following construction and issue a Permit to Operate (PTO) to cover the three-year demonstration period. Typically PTO's cover four years. Following this period the OAM will issue a renewal permit to begin covering the commercial operation period. The renewal permit will be based on an evaluation of emission information.

# APPENDIX E

## U.S. DEPARTMENT OF ENERGY, AND BURNS AND ROE COMMENTS ON DRAFT ENVIRONMENTAL IMPACT VOLUME

**Department of Energy**
Pittsburgh Energy Technology Center
P.O. Box 10940
Pittsburgh, Pennsylvania 15236-0940

March 14, 1989

Mr. Frank Bolinsky
Pure Air
Two Windsor Plaza
2 Windsor Drive, Suite 303
Allentown, PA 18195



SUBJECT: Draft Environmental Information Volume

Dear Mr. Bolinsky:

Enclosed are three sets of comments on Pure Air's Draft Environmental Information Volume (EIV). The comments were prepared by:

1. Winston Williams, Burns and Roe
2. Tom Ruppel, DOE/PETC
3. Tom Sarkus, DOE/PETC

After you review these comments, we will hold a meeting to discuss both the comments and your anticipated response. The meeting will be held on Tuesday, March 22, 1989, at Burns and Roe's home office in Oradell, NJ. It will last from 8:00 a.m. until approximately 11:00 a.m. Please bring Steve Dennis and Spenser Huston along.

Based upon our milestone schedule, your second (and hopefully final) draft EIV is due by April 17, 1989. We will begin working on the Environmental Assessment as soon as the EIV is finalized. Therefore, you are encouraged to submit your revised EIV as soon as possible.

Sincerely,

Tom Sarkus

Thomas A. Sarkus
Project Manager
Office of Clean Coal Technology

Enclosures

cc: w/enclosures
E. Evans, CT-10
R. Rogus, AD-21
T. Ruppel, CT-10
T. Sarkus, CT-10

## Review of Environmental Information Volume
## Pure Air Project

### Specific Technical Comments

| Page(para)# | Comments |
|---|---|
| E-1. 1-2(4) | Until a firm contract is in force, this gypsum should be treated as a waste byproduct. It will help readers if a statement on the purity of this compound is given - eg. % purity. |
| E-2. 2-1(2) | "... the potential for avoiding ....." should be changed to "...the potential for reducing ...", since solid waste and liquid wastes are produced, see page 2-30. |
| E-3. 2-2(-) | The scale of the map included is not shown. Include other industrial complexes of interest within the environs of the NIPSCO's site, eg. Steel plants etc. |
| E-4. 2-1(2) | State the % of sulfur in the US coals that will be used or can be used in this AFGD system. Page 2-22 suggested that the coal of Indiana has a sulfur content of 4.51% ultimate analysis. Can this sulfur content be used throughout the write up of the Environmental Assessment?. |
| E-5. 2-3(1) | Include a map of the entire property, showing the locations of the existing plant structures, and the proposed locations of the structures to be constructed for the AFGD system. Figure 2.1-5 is a detailed version of this map. |
| E-6. 2-6(6) | The current NPDES does not cover the wastes described on page 2-30. A permit will have to be applied for, for the disposal of:<br>(a) Solid wastes - gypsum, salts<br>(b) Liquid (process water) high in Chlorides. |
| E-7. 2-7(3) | There is a need for information, or a statement about the probability of success with the retrofit, in achieving 90% $SO_2$ removal. |
| E-8. 2-10(3) | What is the inlet concentration of $SO_2$ in the AFGD system that is proposed by Pure Air, to |

achieve the 90% removal efficiency?.

E-9. 2-11(1) Specify (or estimate) the probability of achieving 90% efficiency with a coal fired power plant, as opposed to industrial coke fired boiler which has been referenced in the EIV.

E-10. 2-11(1) Provide more details of the quality and quantity of the flyash produced, and how compare these values with the current production of flyash, ie. the delta value.

E-11. 2-11(3) Details is given about recycling part of the process water into the WES for evaporation. What is the fate of the other parts of the wastewater produced by the gypsum dewatering operation. Specify the quantity that is produced, and the percentage of that wastewater that is recycled.

E-12. 2-11(3) Will the chloride in the wastewater produced by the gypsum operation affect the AFGD system when pumped back to the flue gas upstream of the system?. If so, what will the impact on the $SO_2$ removal efficiency be?.

E-13. 2-12(3) What is the concentration of $SO_2$ in the flue gas entering the AFGD system, and how does this compare with that of Kainan Station in Japan that is referenced?.

E-14. 2-12(3) Will scaling the AFGD system upwards from the Kainan Station in Japan affect the efficiency of the $SO_2$ removal?.

E-15. 2-13(1) There is need for clarification of the statement 'no solid waste from the process'. What is the classification of the flyash from the WES?. What is the need for permit # 64-08-92-0248?.

E-16. 2-13(1) The emphasis on reduced liquid wastes should be stressed rather than no liquid wastes.

E-17. 2-13(2) Given that US coals have high sulfur content, what guarantees exist that the $SO_2$ removal efficiency of 90% will be achieved in this project?. If 90% removal efficiency is achieved, can it be maintained on a constant basis?. Should a more conservative estimate of the efficiency be

made at this stage of the demonstration period?.

E-18. 2-15(1) What is the concentration of $SO_2$ in the inlet flue gas, and how does this compare with the concentration and removal efficiency of the West German Veba Kraftwerke Ruhr AG's plants?.

E-19. 2-15(2) If there are failures with the module, and given no spare module, will there be excursions of $SO_2$ emissions to the ambient air. If so, what amounts will be emitted, and will that be regulated by the NPDES air permit?.

E-20. 2-16(4) Who is responsible for $SO_2$ excursions, if any, Pure Air or the Northern Indiana Power Plant?

E-21. 2-23(1) What flexibilities exist for using coal with a sulfur content higher than 4.5% (ultimate analysis), and how will this affect the removal of $SO_2$ produced?. This is important, given the fact that all prior testings were for coal with lower sulfur content.

E-22. 2-24( ) The figure on page 2-24 shows wastewater leaving the system after the thickener. What is the quantity (flow rate) and how is it disposed off?. Show on the figure how this wastewater to the WES mentioned in 2-33(4) enters the $SO_2$ removal system.
It may be helpful if mass balance diagrams are provided. Process flow schematic diagrams with mass balance information should be provided for the following at the very least:
(a) Sulfur and $SO_2$
(b) Water
(c) Fly ash
(d) Gypsum
(e) Thermal energy

E-23. 2-25 Indicate on the figure that shaded portion represents the retrofit of the AFGD system that is proposed.

E-24. 2-26(1) Give the actual feed rates for limestone and $SO_2$, and then state the molar ratio. This is needed by a layman reading the report, and will help clarify the issue.

E-25. 2-26(1) It will be useful if an analysis of the flue gas entering the AFGD system is obtained or estimated. Maybe, the process schematic for mass balance for $SO_2$ will provide this information. It will be useful to let the public know that only 10% of the $SO_2$ produced by the NIPSCO power plant is being emitted through the stack.

E-26. 2-28(2) Portion of the filtrate is sent to the wastewater ponds for disposal. What is the chemical composition of this water, and is it regulated under the NPDES permit for waste water?. Will this water meet the criteria of the permit?.

E-27. 2-30(1) What is the basis for stating that all the waste are not considered to be hazardous?. Provide data to support this.

E-28. 2-30(2) Where will the gypsum be landfilled?. What company will accept this gypsum, and what quantity will be accepted and what time frame?. Will there be a build-up of this material, at or around the site?.

E-29. 2-30(3) What is the quality of this process water?. If not used in the process (recycled), how will it be disposed off?. Will it change or impact the $SO_2$ removal process?.

E-30. 2-30 A note on noise/nuisance levels of vehicles (about 80 truck per day) and the impact on the neighborhood should be inserted after para 3.

E-31. 2-34( ) No land allocation is made for gypsum storage prior to disposal, or for flyash storage prior to disposal. What impact will these have on the land/water resources in the area, considering that the flyash will contain salts of a higher concentration than currently handled?.

E-32. 2-37 Noise levels should be addressed

E-33. 3-3(2) Give the reference of the IDEM study, and extract details about this study for inclusion in the appendix.

E-34. 3-4(1) Reference the "selected governmental agencies" and include extracted data, if possible, from their

reports.

E-35. 3-15( ) Attach a map of the property boundary, indicating any wetland that is within the property boundary, and any immediately adjacent to the plant site. This should be in addition to Figure 3.3-1.

E-36. 3-21(1) The places mentioned in para 1 and 2 should be indicated in a map of adequate scale, for clarity.

E-37. 3-22(4) Is 40 cm/s equivalent to 1 mph, or is it an approximation?

E-38. 3-25(1) Get documentary evidence to prove the absence of protected or endangered wildlife within the property boundary. The Wildlife and Conservation Society of the area should be able to provide this document.

E-39. 3-31(2) Get confirmation about the transient migration of land vertebrates in the area. Again, the Wildlife and Conservation Society of the area should be able to provide this detail.

E-40. 3-43(3) The sighting of a bald eagle should be documented stating by whom, when and where?. Get confirmation from the Wildlife and Conservation Society that the bald eagle does not nest within the plant area.

E-41. 3-43(3) The figure referenced on page 3-43 para 3, is it 3.2-4 or 3.2-2?

E-42. 3-50 Figure 3.5-1 has to be enlarged to show the details, and the area of NIPSCO and the coastline clearly marked out.

E-43. 4-1(1) The inclusion of "...water will be sprayed on the roads etc, where and when necessary, to reduce fugitive dust during construction" will help alleviate fears of dust. Noise levels should also be addressed at this stage.

E-44. 4-1(2) Why will the $NO_x$ at ground level be increased with this AFGD system? Please clarify and state reasons for this.

E-45. 4-1(3) Give an estimate of the fugitive emissions from

transport of crushed limestone. Will this emission meet with the requirements of the State of Federal regulations for fugitive dust?.

E-46. 4-4(1) Clarify what impact the disposal of gypsum will have on land use of the area. Will it affect water quality around the site?.

E-47. 4-5(1) Include a note on the treatment and cleanup of oil spills if they occur on site during construction.

E-48. 4-5(2) A permit may be required for the process water which is high in chlorides.

E-49. 4-4(2) Details about the landfill used will be helpful. Its design and size are important.

E-50. 4-6(6) Specify these waste materials and the quantity of each material. Specify or provide more details of the 'appropriate containers' that will be used to minimize potential contamination of surface water.

E-51. 4-8( ) The flowrate of the wastewater to the pond is 116.8 gpm. Indicate what % of the wastewater from the AFGD system is diverted to the ponds.

The chloride content of the wastewater is high at 23,072 mg/L. A permit will be required for this if it is to be discharged to Lake Michigan, where the regulated daily maximum concentration of chlorides is 20 mg/L. The regulated amount of fluorides is 1.0 mg/L at Lake Michigan, and given the process water with a concentration of $F^-$ of 1095 mg/L, then provisions must be made for adequate mixing to comply with regulations.
It may be useful to get the current analysis of the water in Lake Michigan around the plant, and model the discharge of this wastewater, to determine the changes in chloride accumulation that may result.

6

3-6-89
TC Ruppel

COMMENTS ON PURE AIR DRAFT EIV

The Draft EIV appears to be in good format and the content appears to be fairly complete. Following the thorough review by PETC's contractor, Burns & Roe Services Corp., and these review comments, we expect that the second draft should be sufficient to have BRSC write an Environmental Assessment NEPA document for review by DOE Assistant Secretary for Environment, Safety & health.

E-52 P. 2-24, Fig. 2.1-4, Show mass balances, including coal input and stream compositions (e.g., SO2, CO2 of stack gases), before and after action. The table on P. 4-2 should be incorporated also into the flow diagrams. This is the kind of information that we are looking for and it should be displayed prominently.

E-53 P. 2-6, Include wastewater discharge to Lake Michigan in a 'before action' flow diagram. Is the wastewater the noncontact cooling water? See also P. 4-4, below.

E-54 P. 2-21, Fig. 2.1-3, It is expected that Environmental Issues will continue to at least September 1989 and not end in February 1989 as shown (see TYPICAL NEPA PROCESS TIME SCHEDULE distributed by PETC).

E-55 P. 2-27, Minor point, balance $2H^+$ in last equation.

E-56 P. 2-34, The difference in land needed, between 1.72 acres and 4 acres on P. 2-3, should be discussed.

E-57 P. 3-3, The Attainment vs. Nonattainment status of Porter County for the Criteria Pollutants should be addressed.

E-58 P. 3-24, The FEMA/FIRM floodplain and wetlands maps should be included as an appendix, possibly as an insert in the inside back cover.

E-59 P. 3-25, Concerning fauna and flora ecological resources, letters from the appropriate Indiana environmental agency or the U.S. Fish and Wildlife Service, as appropriate, concerning its agreement with the statements on P. 3-25 should appear as an appendix.

E-60 P. 4-4, The alternative gypsum disposal information is important and should appear on the flow diagram too.

E-61 P. 4-5, The Indiana Department of Environmental Management's approval for waiving ground water monitoring should appear in an appendix.

E-62 P. 4-6, First line, "appropriately approved facilities" should be defined, especially by a copy of a permit in an appendix.

E-63 P. 5-4, The status of the several permits should be included, i.e., "Obtained" or targeted date for obtaining. The ANTICIPATED PERMITS/APPROVALS Section 5.2 (p. 5-7) is good, but anticipated dates for obtaining permits should be given somewhere.

E-64 App. A, A copy of the letter from the Advisory Council on Historic Preservation should in included.

E-65 App. B is in general good. (No response required.)

E-66 App. B, The outfalls cited, e.g., 001, 002, 100, 111 should be identified in the flow diagram on Fig. 2.1-4 (p. 2-24) or on a separate flow diagram, preferably in conjunction with the site plan Fig. 2.1-5, p. 2-25. The NPDES Permit Table 5.1-2 is good, but flows should appear somewhere.

We would appreciate your using a slightly wider looseleaf binder for the second and probably final draft.

COMMENTS ON PURE AIR'S DRAFT ENVIRONMENTAL INFORMATION VOLUME

T. Sarkus, 3/13/89

E-67 1. Page 2-5, Last Paragraph. It is noted that Bailly units 7 and 8 have a combined capacity of 528 MW. Yet the draft air permits shown in Appendix B show a combined capacity of 518 MW. Please explain. A

E-68 2. Page 2-22. An ultimate coal analysis is shown. I assume that it is an average analysis for coal consumed at the Bailly station, which is good. Can you also show the approximate range for each coal characteristic, e.g. S 2.5 to 6.5?

E-69 3. Page 3-5. Capitalize names of geologic periods such as Silurian. Change dolomite limestone to dolomitic limestone.

E-70 4. Page 4-3. It is mentioned that the green belt will not be affected by this project. For the unfamiliar reader, please describe the green belt.

E-71 5. Page 5-3. In the first paragraph, it is noted that typical coal and limestone samples will be processed in a test unit, in order to assess the by-product gypsum. Where is the test unit located, and when will these tests occur? B

Footnotes

A. The Bailly Station Units 7 and 8 have a permitted combined capacity of 528 MW. The Indiana OAM has been notified of the typographical error in the permit.

B. This question has not been addressed in the EIV since DOE indicated in a meeting on March 22, 1989 that a verbal response would prove satisfactory.